JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Course Structure for Civil Engineering
B.Tech(Regular)
(For batches admitted from the year 2013)

I YEAR **I SEMESTER**

Sl.No.	Subject		L	T	P	Credits
1	Theory	English-I	3	1	0	3
2	Theory	Mathematics-I	3	1	0	3
3	Theory	Environmental Studies	3	1	0	3
4	Theory and Practical	Engineering Graphics	2	0	2	3
5	Theory	Engineering Chemistry	3	1	0	3
6	Practical	Engineering Workshop & IT workshop	0	0	3	2
7	Practical	Engineering Chemistry Lab	0	0	3	2
8	Practical	Communication Skills Lab	0	0	3	2
	Total		**14**	**4**	**11**	**21**

I YEAR **II SEMESTER**

Sl.No.	Subject		L	T	P	Credits
1	Theory	English-II	3	1	0	3
2	Theory	Mathematics-II	3	1	0	3
3	Theory	Computer Programming	3	1	0	3
4	Theory	Engineering Physics	3	1	0	3
5	Theory	Building Materials and Construction	3	1	0	3
6	Theory	Engineering Mechanics	3	1	0	3
7	Practical	Engineering Physics Lab	0	0	3	2
8	Practical	Computer Programming Lab	0	0	3	2
	Total		**18**	**6**	**6**	**22**

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II B.Tech– I Sem

Sl.No	Subject		**L**	**T**	**P**	Credits
1	Theory	Mathematical Methods	3	1	0	3
2	Theory	Electrical and Mechanical Technology	3	1	0	3
3	Theory	Strength of Materials - I	3	1	0	3
4	Theory	Surveying – I	3	1	0	3
5	Theory	Fluid Mechanics	3	1	0	3
6	Theory	Building Planning & Drawing	3	1	0	3
7	Audit Course	Human Values & Professional Ethics	2	-	-	-
8	Practical	Surveying Lab – I	0	0	3	2
9	Practical	Strength of Materials Lab	0	0	3	2
	Total		20	6	6	22

II B.Tech– II Sem

Sl.No	Subject		**L**	**T**	**P**	Credits
1	Theory	Probability & Statistics	3	1	0	3
2	Theory	Strength of Materials – II	3	1	0	3
3	Theory	Hydraulics & Hydraulic Machinery	3	1	0	3
4	Theory	Managerial Economics & Financial Analysis (MEFA)	3	1	0	3
5	Theory	Structural Analysis – I	3	1	0	3
6	Theory	Surveying – II	3	1	0	3
7	Practical	Fluid Mechanics & Hydraulic Machinery Lab	0	0	3	2
8	Practical	Surveying Lab - II	0	0	3	2
	Total		20	6	6	22

Note:- Survey camp for a duration of two weeks to be conducted before the commencement of III B.Tech, I – Sem class work, in the II B.Tech, II-Sem break. This survey camp has to be evaluated for 50 marks by the internal faculty. It has a weightage of 2 credits. The marks and credits will be incorporated in IV – B.Tech, II – Sem marks memo.

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III B.Tech **I Sem**

Sl.No	Subject		**L**	**T**	**P**	Credits
1	Theory	Design & Drawing of reinforced concrete Structures	3	1	0	3
2	Theory	Concrete Technology	3	1	0	3
3	Theory	Transportation Engineering - I	3	1	0	3
4	Theory	Water resources Engineering -I	3	1	0	3
5	Theory	Structural Analysis – II	3	1	0	3
6	Theory	Engineering Geology	3	1	0	3
7	Practical	Engineering Geology Lab	0	0	3	2
8	Practical	Concrete Technology Lab	0	0	3	2
	Total		18	6	6	22

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III B.Tech **II Sem**

S.No	Subject		**L**	**T**	**P**	Credits
1	Theory	Design & Drawing of Steel Structures	3	1	0	3
2	Theory	Geotechnical Engineering – I	3	1	0	3
3	Theory	Environmental Engineering	3	1	0	3
4	Theory	Water Resources Engineering – II	3	1	0	3
5	Theory	Estimation & Costing	3	1	0	3
6	Theory	Green Buildings	3	1	0	3
7	Practical	Geotechnical Engineering Lab	0	0	3	2
8	Practical	Environmental Engineering Lab	0	0	3	2
9	Audit Course	Advanced Communication skills lab	-	-	2	-
	Total		18	6	6	22

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IV B.Tech **I Sem**

S.No	Subject		**L**	**T**	**P**	Credits
1	Theory	Finite Element Methods in civil Engineering	3	1	0	3
2	Theory	Bridge Engineering	3	1	0	3
3	Theory	Geotechnical Engineering – II	3	1	0	3
4	Theory	Transportation Engineering – II	3	1	0	3
5	Theory	Open Elective	3	1	0	3
6	Theory	Elective-I (MOOC)	3	1	0	3
7	Practical	CAD Lab	0	0	3	2
8	Practical	Highway Materials Lab	0	0	3	2
9	Project	Part-A – Seminar	-	-	-	2
	Total		18	6	6	24

S.No	**Subject**
	OPEN ELECTIVE
1.	Building construction and Management
2.	Disaster Management & Mitigation
3.	Architecture & Town Planning
4.	Intellectual Property Rights

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IV B.Tech **II Sem**

S.No	Subject		**L**	**T**	**P**	Credits
1	Theory	Advanced Structural Engineering	3	1	0	3
2	Theory	Design and Drawing of Irrigation Structures	3	1	0	3
3	Theory	Elective-II	3	1	0	3
4	Theory	Elective-III	3	1	0	3
5		Comprehensive Viva-Voce & Seminar	-	-	-	3
6	Project	Part-B	-	-	-	8
		Survey Camp (Conducted before III – B.Tech I-Sem)	-	-	-	2
	Total		15	4	0	25

S.No	**Subject**
	ELECTIVE – II
1.	Advanced Foundation Engineering
2.	Remote Sensing & GIS
3.	Rehabilitation and Retrofitting of Structures
	ELECTIVE – III
1.	Experimental Stress Analysis
2.	Prestressed concrete
3.	Earth Quake Resistant design of structures

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B.Tech. III - I sem (C.E.)	**T**	**P**	**C**
	3+1*	**0**	**3**

DESIGN & DRAWING OF REINFORCED CONCRETE STRUCTURES

OBJECTIVE: *Structural elements are subjected to different loading to with stand the structures, for external loading we need to design the structures for its safety and serviceability.*

UNIT –I

Concepts of RC. Design –Introduction to Working stress method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS: 456 – 2000.

Beams **:** Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – II

Shear, Torsion and Bond **:** Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing

Limit state design for serviceability for deflection, cracking and codal provision.

UNIT - III

Design of Two-way slabs, one way slab, continuous slab Using I S Coefficients, Cantilever slab /Canopy slab.

UNIT –IV

Short and Long columns –axial loads, uni axial and biaxial bending I S Code provisions.

UNIT – V

Design of Footings - isolated (square, rectangular) and Combined footings.

Design of Stair case – Dog legged and Open well.

NOTE : All the designs to be taught in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, Two way and continuous slabs

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS:

1. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. Reinforced Concrete Design by N. Krishna Raju and R.N. Pranesh, New Age International Publishres, New Delhi
3. Limit State Designed of Reinforced Concrete – P.C.Varghese, Prentice Hall of India, New Delhi

REFERENCES :

1. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad
2. Fundamentals of Reinforced Concrete by N.C. Sinha and S.K Roy, S. Chand publishers
3. Analysis of skeletal structures by Seetharamulu Kaveti, TMH pubilications.
4. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
5. Principles and detailing of concrete structures by D.S.Prakash Rao, TMH pubilishers.
6. SP-16:Design Aids for Reinforced Concrete to IS 456

Codes/Tables: IS 456-2000 code book to be permitted into the examinations Hall.

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	3+1*	**0**	**3**

CONCRETE TECHNOLOGY

OBJECTIVE: *Lot of advances is taking place in the concrete technology as par with development taking place in the engineering. The present day industry needs the knowledge of concrete technology thoroughly. The subject is designed to give the basic knowledge as well as latest developments in concrete technology.*

UNIT I

CEMENTS & ADMIXTURES: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Test`s on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures-Relavent Codes.

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size-Relevant Codes.

UNIT – II

FRESH & HARDENED CONCRETE: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.Water / Cement ratio – Abram's Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compressive & tensile strength - Curing. Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Relevant Codes

UNIT – III

SPECIAL CONCRETES: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON – -Relevant Codes

UNIT – IV

ELASTICITY, CREEP & SHRINKAGE: Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

Introduction to Non-destructive testing methods – Rebound Hammer – Ultra Pulse Velocity method – Pullout - codal provisions for NDT.

UNIT – V

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method

TEXT BOOKS:

1. Properties of Concrete by A.M.Neville – Pearson Publication – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co.
3. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

REFERENCES:

1. Textbook of Concrete Technology by Kulkarni, P. D.-New Age Pubilishers
2. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi
3. Concrete: Micro structure, Properties and Materials – P.K.Mehta and J.M.Monteiro, Mc-Graw Hill Publishers
4. Design of Concrete Mix by Krishna Raju, CBS pubilishers.
5. Non-Destructive Test and Evaluation of Materials by J.Prasad & C.G.K. Nair , Tata Mcgraw hill Publishers, New Delhi.
6. Testing of Concrete in Structures by John H.Bungey, Taylor & Francis.

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	3+1*	**0**	**3**

TRANSPORTATION ENGINEERING - I

OBJECTIVE: *It deal with different components of Highway Engineering. Emphasis is on Geometric Design of different elements in Highway Engineering.*

UNIT I
HIGHWAY DEVELOPMENT AND PLANNING:
Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II
HIGHWAY GEOMETRIC DESIGN:
Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients-Vertical curves.

UNIT – III
TRAFFIC ENGINEERING:
Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation – Highway capacity and level of service concept – factors affecting capacity and level of service - Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams.
TRAFFIC REGULATION AND MANAGEMENT:
Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Specifications - Design of Traffic Signals –Webster Method – Saturation flow – phasing and timing diagrams – Numerical problems.

UNIT – IV
INTERSECTION DESIGN:
Conflicts at Intersections- Channelisation: Objectives –Traffic Islands and Design criteria-Types of At-Grade Intersections – Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT – V

PAVEMENT DESIGN:

Types of pavements – Difference between flexible and rigid pavements – Pavement Components – Sub grade, Sub base, base and wearing course – Functions of pavement components – Design Factors – Flexible pavement Design methods – G.I method, CBR Method, (as per IRC 37-2002) –Design of Rigid pavements – Critical load positions - Westergaard's stress equations – computing Radius of Relative stiffness and equivalent radius of resisting section – stresses in rigid pavements – Design of Expansion and contraction joints in CC pavements. Design of Dowel bars and Tie bars.

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.
3. Text book of Highway Engineering by R.Srinivasa Kumar, Universities Press, Hyderabad

REFERENCES:

1. Traffic Engineering and Transportation planning by L.R.Kadiyali and Lal- Khanna Publications.
2. Transportation Engineering an introduction by Khisty Lal, Pearson Pubilications
3. Highway Engineering – S.P.Bindra , Dhanpathi Rai & Sons. – 4th Edition (1981)
4. Introduction to Transportation Engineering by James.H.Banks, Tata Mc.Grawhill Edition, New Delhi
5. High way engineering by Paul .H.Wright & Karen K.Dixon,wiley india limited
6. A Text book of Transportation Engineering by S.P.Chandola, S.Chand Publications, New Delhi.

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	3+1*	**0**	**3**

WATER RESOURCES ENGINEERING-I

OBJECTIVE:

To study the concepts of

i. *Engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.*
ii. *Irrigation Engineering – Water utilization for Crop growth, canals and their designs.*

UNIT – I

INTRODUCTION TO HYDROLOGY: Engineering hydrology and its applications; Hydrologic cycle; precipitation- types and forms, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, presentation and interpretation of rainfall data.

DESCRIPTIVE HYDROLOGY: Evaporation- factors affecting evaporation, measurement of evaporation; Infiltration- factors affecting infiltration, measurement of infiltration, infiltration indices; Run off- Factors affecting run- off, components of run-off; Estimation of run-off; separation of base flow.

UNIT – II

HYDROGRAPH ANALYSIS: Hydrograph; Unit Hydrograph- construction and limitations of Unit hydrograph, Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; S-hydrograph.

GROUND WATER: Introduction; Aquifer; Aquiclude; Aquifuge; Types of aquifers, aquifer parameters- porosity, Specific yield, Specific retention, storage coefficient-coefficient of permeability and transmissibility; well hydraulics- Darcy's law; Steady radial flow to a well in confined and unconfined aquifers; un Steady radial flow to a well in confined and unconfined aquifers.

UNIT – III

IRRIGATION: Introduction; Necessity and Importance of Irrigation; advantages and ill effects of Irrigation; types of Irrigation; methods of application of Irrigation water; quality for Irrigation water. Duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty.

WATER REQUIREMENT OF CROPS: Types of soils, Indian agricultural soils, preparation of land for Irrigation;; vertical distribution of soil moisture; Limiting soil moisture conditions; Depth and frequency of irrigation; duty and delta, factors affecting duty, Gross command area; Culturable command area; Culturable cultivated and uncultivated area;

Kor depth and Kor period. Consumptive use of water-factors affecting consumptive use, direct measurement and determination by use of equations (theory only)

UNIT – IV

CHANNELS – SILT THEORIES: Classification; Canal alignment; Inundation canals; Silt theories–Kennedy's theory, Kennedy's method of channel design; Drawbacks in Kennedy's theory; Lacey's regime theory- Lacey's theory applied to channel design; Defects in Lacey's theory; Comparison of Kennedy's and Lacey's theory.

WATER LOGGING: Water logging; Effects of water logging; Causes of water logging; Remedial measures;

UNIT – V

DIVERSION HEAD WORKS: Component parts of diversion head works; Diversion and Storage head works; weirs and barrages; Layouts of diversion head works; components; Causes and failure of hydraulic structures on pereable foundations; Blighs creep theory; Khoslastheory.

CANALOUTLETS: Introduction; types of outlet; flexibility, proportionality, setting ,hyper proportional outlet, sub-proportional outlet, sensitivity.

TEXT BOOKS:

1. Irrigation and Water Power Engineering by Punmia & Lal, Laxmi Publications pvt. Ltd., New Delhi
2. Engineering Hydrology by Srinivasan ,Oxford Publishers, New Delhi
3.Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:

1. Water Resources Engineering : Principles and Practice by Murthy, Challa Satya- New Age Pubilishers
2. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, Delhi
3. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
4. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.

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	3+1*	**0**	**3**

STRUCTURAL ANALYSIS – II

OBJECTIVE: *Indeterminate structures are subjected to different loading with different supported conditions; hence it is necessary to study the behaviour of the structures.*

UNIT-I

SLOPE-DEFLECTION & MOMENT DISTRIBUTION METHOD For Frames:- Analysis of single bay, single storey, portal frame including side sway– Stiffness and carry over factors – Distribution factors – Analysis of single storey portal frames – including Sway - Substitute frame analysis by two cycle method.

UNIT – II

KANI`S METHOD:-

Analysis of continuous beams – including settlement of supports and single bay, single storey portal frames with side sway by Kani's method.

UNI T – III

FLEXIBILITY & STIFFNESS METHODS FOR FRAMES :-

Flexibility methods, Introduction, application to continuous beams including support settlements-Introduction to stiffness method and its application application to continuous beams including support settlements.

UNIT IV

ARCHES : Three hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature-Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – (No analytical question).

UNIT – V

PLASTIC ANALYSIS:

Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

TEXT BOOKS:

1. Analysis of Structures – Vol. I & 2 by Bhavikatti, Vikas publications
2. Analysis of structures by Vazrani & Ratwani – Khanna Publications.
3. Theory of structures by Ramamuratam, Jain Book Depot , New Delhi.

REFERENCES:

1. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.
2. Strength of Materials and Mechanics of Solids Vol-2 by B.C. Punmia, Laxmi Publications, New Delhi
3. Introduction to Structural Analysis by Nautiyal, B. D.- New Age Pubilishers.
4. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.
5. Basic Structural Analysis by K.U.Muthu *et al.,* I.K.International Publishing House Pvt.Ltd

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	3+1*	**0**	**3**

ENGINEERING GEOLOGY

OBJECTIVES: *The objectives of this subject to give the basic knowledge of Geology that is required for construction of various Civil Engineering Structures. The syllabus includes the basics of Geology. Geological hazard's and gives a suitable picture on the Geological aspects that are to be considered for the planning and construction of major Civil Engineering projects.*

UNIT – I

INTRODUCTION:

Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS : Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like "Granite"

MINERALOGY :

Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartiz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT – II

PETROLOGY :

Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

STRUCTURAL GEOLOGY :

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults un conformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT – III

GROUND WATER ,EARTH QUAKE &LAND SLIDES:-

Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT –IV

GEOPHYSICAL STUDIES:-

Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

UNIT – V

GEOLOGY OF DAMS ,RESERVOIRS AND TUNNELS :

Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor's Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

1) Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
2) Engineerring geology by Prabin Singh, Katson Pubilcations
3) Engineerring geology by vasudev kanthi, Universities press, Hyderabad.

REFERENCES:

1. Engineering Geology by Subinoy Gangopadhyay, Oxford University press.
2. Engineering Geology by Reddy, M.T.M.New Age Pubilishers
3. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications
4. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992
5. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution,
6. Engineering Geology by D.Venkata Reddy, Vikas Publications, New Delhi.

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	0	**3**	**2**

ENGINEERING GEOLOGY LAB.

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Inter pretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

Text Books:-

1. Elementary Exercises in Geology by CVRK Prasad, Universities press.
2. Applied Engineering Geology Practicals (Lab. Practice) by M.T.M.New Age Pubilishers

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	0	**3**	**2**

CONCRETE TECHONOLOGY LAB

1. Normal Consistency of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.
5. Workability test on concrete by compaction factor, slump and Vee-bee.
6. Modulus of Elasticity of concrete.
7. Compressive strength, Modulous of Rupture and Split Tensile Strength of Concrete
8. Specific Gravity and Water Absorption of Coarse aggregate.
9. Bulking of Fine aggregate.
10. Non-Destructive testing on concrete (for demonstration)

REFERENCES:

1. Concrete Manual by M.L.Gambhir, Dhanpat Rai & Co
2. Relevant IS Codes

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	3+1*	**0**	**3**

DESIGN & DRAWING OF STEEL STRUCTURES

OBJECTIVE: *To understand design specifications, loading and design procedures of different steel structures as per BIS specifications.*

UNIT – I

Materials – Making of iron and steel – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads–and combinations loading wind loads on roof trusses, behavior of steel, local buckling. Concept of limit State Design – Different Limit States as per IS 800 -2007 – Design Strengths- deflection limits – serviceability - Bolted connections – Welded connections – Design Strength – Efficiency of joint – Prying action Types of Welded joints - Design of Tension members – Design Strength of members.

UNIT – II

Design of compression members – Buckling class – slenderness ratio / strength design – laced – battened columns –column splice – column base – slab base.

UNIT – III

Design of Beams – Plastic moment – Bending and shear strength laterally / supported beams design – Built up sections – large plates Web buckling Crippling and Deflection of beams, Design of Purlin.

UNIT – IV

Design of eccentric connections with brackets, Beam end connections – Web angle – Un-stiffened and stiffened seated connections (bolted and Welded types) Design of truss joints

UNIT – V

Plate Girder: Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates stiffeners – splicings and connections.
Gantry Girder : Gantry girder impact factors – longitudinal forces, Design of Gantry girders.

Note: The students should prepare the following plates.
Plate 1 Detailing of simple beams
Plate 2 Detailing of Compound beams including curtailment of flange plates.
Plate 3 Detailing of Column including lacing and battens.
Plate 4 Detailing of Column bases – slab base and gusseted base
Plate 5 Detailing of steel roof trusses including particulars at joints.

Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS

1. Design of Steel Structures by K.S.Sai Ram , Pearson Pubilishers.
2. Limit State Design of Steel Structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi.
3. Design of Steel Structures by Bhavikatti. IK INT Publication House, New Delhi, 2010.

REFERENCES

1. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad.
2. Structural Design in Steel by Sarwar Alam Raz, New Age International Publishers, New Delhi
3. Steel Structures by Subramanyam.N, Oxford University press, New Delhi
4. Design of Steel Structures by Edwin Gaylord, Charles Gaylord,James Stallmeyer, Tata Mc.Graw-Hill, New Delhi.

Codes/Tables:

IS Codes:

1) IS -800 – 2007
2) IS – 875 – Part III
3) Steel Tables.
4) Railway Design Standards Code. and **steel tables** to be permitted into the examination hall.

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	3+1*	**0**	**3**

GEOTECHNICAL ENGINEERING – I

OBJECTIVE: *The object of this course is to make the student to understand the behaviour of soil under different loads and different conditions. This is necessary because the safety of any structure depends on soil on which it is going to be constructed.*

UNIT – I

INTRODUCTION: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship – Relative density.

INDEX PROPERTIES OF SOILS: Moisture Content, Specific Gravity, Insitu density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

UNIT –II

PERMEABILITY: Soil water – capillary rise – flow of water through soils – Darcy's law-permeability – Factors affecting – laboratory and Field determination of coefficient of permeability –Permeability of layered systems.

SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

UNIT – III

STRESS DISTRIBUTION IN SOILS: Boussinesq's and Westergaard's theories for point loads and areas of different shapes – Newmark's influence chart .

COMPACTION: Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment – compaction control.

UNIT – IV

CONSOLIDATION : Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil and under consolidated soil - preconsolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement..

UNIT – V

SHEAR STRENGTH OF SOILS : Importance of shear strength **–** Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on

drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio – Liquefaction- shear strength of clays.

TEXT BOOKS:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Soil Mechanics and Foundation by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

REFERENCES:

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi.
2. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
3. Geotechnical Engineering V.N.S.Murthy, CRC Press, Newyork, Special Indian Edition
4. Geotechnical Engineering by Brije.M.Das, Cengage Publications, New Delhi.

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ENVIRONMENTAL ENGINEERING

OBJECTIVE: *This subject provides the knowledge of water sources, water treatment, design of distribution system waste water treatment, and safe disposal methods. The topics of characteristics of waste water, sludge digestion are also included.*

UNIT – I

INTRODUCTION: Importance and Necessity of Protected Water Supply systems, Objectives of Protected water supply system, Flow chart of public water supply system, Role of Environmental Engineer.

WATER DEMAND AND QUANTITY STUDIES : Estimation of water demand for a town or city, Types of water demands, Per capita Demand, Factors affecting the Per Capita Demand, Variations in the Demand, Design Period, Factors affecting the Design period, Population Studies, Population Forecasting Studies.

QUALITY AND ANALYSIS OF WATER: Characteristics of water – Physical, Chemical and Biological. Analysis of Water – Physical, Chemical and Biological. Impurities in water, Water borne diseases. Drinking water quality standards.

UNIT - II

WATER TREATMENT: Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants – feeding arrangements. Filtration and Chlorination**:** Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, other disinfection practices- Miscellaneous treatment methods

WATER DISTRIBUTION : Distribution systems – Requirements, Layout of Water distribution systems - Design procedures- Hardy Cross and equivalent pipe methods service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house, waste detection and prevention.

UNIT – III

INTRODUCTION TO SANITATION :systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage – classification of sewerage systems- Estimation of sewage flow and storm water drainage – fluctuations – types of sewers – Hydraulics of sewers and storm drains– design of sewers – materials for sewers- appurtenances in sewerage – cleaning and ventilation of sewers .

WASTE WATER COLLECTION AND CHARACTERSTICS : Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow – characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. – C.O.D. equations.

UNIT IV

WASTE WATER TREATMENT: Layout and general out line of various units in a waste water treatment plant – primary treatment: design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – biological treatment – trickling filters – standard and high rate – Construction and design of Oxidation ponds.

SLUDGE TREATMENT: Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks and Imhoff Tanks, working principles and design – soak pits.

UNIT – V

SOLID WATE MANAGEMENT: Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

AIR POLLUTION: Types of pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

NOISE POLLUTION: Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

TEXT BOOKS:

1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.
2. Water Supply Engineering, Vol. 1, Waste Water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi
3. Water supply and sanitary Engineering by S.K.Garg,Khanna Pubiilshers.

REFERENCS :

1. Water and Waste Water Technology by Mark J Hammar, Pearson Pubilshers.
2. Environmental Pollution Control Engg-C.S.RAO- New Age Pubilishers
3. Elements of Environmental Engineering by K.N.Duggal, S.Chand Pubilishers.
4. Water and Waste Water Engineering by Fair Geyer and Okun, Wiley Publications
5. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
6. Waste water Engineering by Metcalf and Eddy, TMH Pubilications.

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WATER RESOURCES ENGINEERING-II

OBJECTIVE: *To study various head works canal structures and their design principles the subject also covers the river structures, their classifications, designs, etc.*

UNIT – 1

CANAL REGULATION WORKS: Canal falls: Necessity and location of falls; Types of falls; classification of falls; cistern design; design of sarada type fall.

Canal regulators: off-take alignment; head regulators and cross-regulators; design of cross-regulator and distributary head regulator.

CROSS DRAINAGE WORKS: Introduction; types of cross drainage works; selection of suitable type of cross drainage work; classification of aqueducts and siphon aqueducts.

UNIT-II

STREAM GAUGING: Measurement of Stage, measurement of velocity, Area-Velocity method, dilution technique of stream flow measurement, electromagnetic method, ultrasonic method, indirect methods.

RIVER ENGINEERING: Classification of rivers; Meandering; Causes of meandering, general features of meandering, Basic factors controlling process of meandering; Aggrading type of river; Degrading type of River.

UNIT-III

RESERVOIR PLANNING: Introduction; Investigations for reservoir planning; Selection ofsitefor a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of safe yield from a reservoir of a given capacity; Sediment flow instreams:Reservoir sedimentation; Reservoir sediment control; Flood routing;Methodsof flood routing-Graphical Method (Inflow – storage discharge curves method).

DAMS :GENERAL: Introduction; Classification according to use; classification according to material- Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams-advantages and disadvantages; Physical factors governing selection of type of dam ; selection of site for a dam.

UNIT-IV

GRAVITY DAMS: Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure: stability requirements; principal and shear stresses; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam- High and low gravity dams; Design of gravity dams–single step method; Galleries;

EARTH DAMS: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures; Slope protection. Seepage through earth dam – graphical method

UNIT-V

SPILLWAYS: Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons; Spillway crest gates-Types and description only.

WATER POWER ENGINEERING: Development of hydro power in India; Classification of hydel plants: runoff river plants, storage plants and pumped storage plants; low, medium and high head schemes ; components of hydel schemes – fore bay, intake structure, surge tanks, penstocks ,power house, turbines-selection of suitable type of turbine, Scroll casing .draft tube and tail race; assessment of available power; definition of gross head ,operating head ,effective head; primary power and secondary power; installed capacity, dependable capacity; firm power, secondary power; power factor ;load factor, capacity factor and utilization factor .

TEXT BOOKS:

1. Irrigation and Water Power Engineering by Dr. B.C.Punmia & Dr. Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi.
2. Irrigation and Water Resources Engineering by G.L. Asawa, New Age International Publishers
3. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:

1. Water Resources Engineering by Satyanarayana Murthy. Challa, New Age International Publishers
2. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers
3. Irrigation and Water Power Engineering by Punmia and Lal, Laxmi Publications, New Delhi.
4. Irrigation, Waterpower and Water Resources Engineering by K R Arora; Standard Publication, New Delhi.

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	3+1*	**0**	**3**

ESTIMATION & COSTING

OBJECTIVE: *The objective of the course is to make the student to understand about estimation and valuations of different types of structures and their valuation as per standard schedule of rates.*

UNIT – I
INTRODUCTION : General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating. **STANDARDS SPECIFICATIONS :** Standard specifications for different items of building construction

UNIT – II
ESTIMATION OF BUILDINGS : Detailed Estimates of Buildings

UNIT – III
EARTHWORK ESTIMATION : Earthwork for roads and canals.
REINFORCEMENT ESTIMATION : Reinforcement bar bending and bar requirement schedules.

UNIT – IV
CONTRACTS AND TENDERS : Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering.

UNIT – V
RATE ANALYSIS : Working out data for various items of work over head and contigent charges.
VALUATION : Valuation of buildings.
.

TEXT BOOKS
1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Contracts and estimations by B.S.Patil, Universities.Press, Hyderabad.
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.

REFERENCES :
1. Estimating and Costing by G.S. Birdie, Dhanpat Rai Publishing Company (P) Ltd
2. A Text book of Estimating and Costing by D.D.Kohli, S.Chand Pubilishers.

3. Standard Schedule of rates and standard data book by public works department.
4. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
5. National Building Code

Note : Standards scheduled of rates is permitted in the examination hall.

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GEOTECHNICAL ENGINEERING LAB

OBJECTIVE: *To obtain the properties of soils by conducting experiments, it is necessary for students to understand the behavior of soil under various loads and conditions.*

LIST OF EXPERIMENTS

1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Specific gravity of soils by Density Bottle method & Pycnometer method
5. Permeability of soil, constant and variable head test
6. Compaction test
7. CBR Test
8. Consolidation test
9. Unconfined compression test
10. Tri-axial Compression test
11. Direct shear test.
12. Vane shear test

NOTE: At least **EIGHT** of the above experiments are to be conducted.

TEXT BOOKS:

1.Soil Testing Lab Manual by K.V.S. Appa Rao & V.C.C.Rao,University Science Press , Laxmi Publication.
2. Soil Testing for Engineers by S.Mittal and J.P.Shukla, Kahna Publishers, New Delhi.
3. Relevant IS Codes.

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ENVIRONMENTAL ENGINEERING LAB

OBJECTIVE: *The laboratory provides knowledge of estimating various parameters like PH, Chlorides, Sulphates, Nitrates in water. For effective water treatment, the determination of optimum dosage of coagulant and chloride demand are also included. The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.*

LIST OF EXPERIMENTS

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coliform test.

NOTE: At least **EIGHT** of the above experiments are to be conducted.

TEXT BOOKS:

1. Chemistry for Environmental Engineering by Sawyer and Mc. Carty,TMH Pubilications
2. Environmental Engineering Lab Manual by Dr.G.Kotaiah and Dr.N.Kumara Swamy, Charotar Publishers.

REFERENCE

1. Relevant IS Codes.

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	3+1*	**0**	**3**

GREEN BUILDINGS

The objective of the course is to make the student to understand about recycled material top protect environment by providing energy efficiency models and eco friendly materials.

UNIT – I INTRODUCTION:

Fundamentals of Energy-Energy production systems-Energy Economic Analysis-Energy Conservation And Audits- Primary Energy use in Buildings-Residential Commercial-Institutional And Public Buildings. Energy and resource conservation-Principles, Design of green buildings-rating systems-LEED Standards-Evaluation Tools for Building Energy-Energy Efficient Design Strategies.

UNIT – II ENERGY EFFICIENCY

Energy in Building Design-Energy Efficient and Environmental Friendly Building- Climate, Sun and solar radiation-Psychometrics-Passive Heating and Cooling Systems-Energy flow diagram-Energy consumption/Unit production- Identification of wastage-Priority of conservative measures-Maintenance of Energy Management Programme

UNIT – III ENVIRONMENTAL IMPACT OF BUILDING MATERIALS

Measuring the impact of building materials- calculating embodied energy- recycling and embodied energy- processing and embodied energy- time and embodied energy- embodied energy of different building materials- low energy building and masonry materials- life cycle analysis- Case studies and analysis.

UNIT– IV GREEN CONSTRUCTION AND ENVIRONMENTAL QUALITY

Sustainable architecture and Green Building: definition- Green building Evaluation Systems; LEED Certification; Green Globe Certification; Case studies which look at the environmental approach renewable energy- controlling the water cycle- impact of materials on the environment – optimizing Construction- site management- environmental management of buildings.

UNIT –V ENERGY MANAGEMENT

Energy Management of Electrical Equipment-Improvement of Power Factor-Management of Maximum Demand- Energy Savings in Pumps-Fans-Compressed Air Systems-Energy Savings in Lighting Systems-Air Conditioning Systems-Applications-Facility Operation And Maintenance- Facility Modifications-Energy Recovery Dehumidifier- Water Heat Recovery-Steam Plants and Distribution Systems- Energy Savings In Pumps-Fans-Compressed air systems- Applications

TEXT BOOKS:-

1. Eco design - A Manual for Ecological design by Ken Yeang, Wiley- Academy
2. Ecohouse: A design Guide by Sue Roaf et all; Elsevier Architectural Press

3. Green Building Construction by Thomas E Glavinich; Wiley.

REFERENCES:

1. Sustainable Design- The science of sustainability and Green Engineering by Daniel Vallero and Chris Brasier, Wiley; 2008
2. Environmental control systems by Moore F., McGraw Hill, Inc., 1994.

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	3+1*	**0**	**3**

FINITE ELEMENT METHODS IN CIVIL ENGINEERING

OBJECTIVE: *To familiarize the student with the latest developments in analysis for Civil Engineering problems.*

UNIT –I

INTRODUCTION: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

PRINCIPLES OF ELASTICITY: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT –II

ONE DIMENSIONAL & TWO DIMENSIONAL ELEMENTS: Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems .Two Dimensional Elements - Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

UNIT –III

GENERATION OF ELEMENT : Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements.

UNIT –IV

ISOPARAMETRIC FORMULATION :

Concepts of, isoparametric elements for 2D analysis –formulation of CST element, 4 – Noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.

UNIT-V

SOLUTION TECHNIQUES: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOK:

1. Finite Elements Methods in Engineering by Tirupati. R. Chandrupatla and Ashok D. Belegundu – Pearson Education Publications.
2. Finite element analysis by S.S. Bhavakatti-New age international publishers

3. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers

REFERENCES:

1. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, New Delhi.
2. Finite element analysis and procedures in engineering by H.V.Lakshminaryana, 3rd edition, universities press, Hyderabad.
3. Finite element method and its application by Desai ,2012, Pearson Pubilications.

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BRIDGE ENGINEERING

OBJECTIVE: *It deal with different types of Bridges like deck slab bridge, T – Beam Bridge e.t.c and gives a god knowledge on different components of bridges.*

UNIT - I

INTRODUCTION:

Importance of site investigation in Bridge design – Design discharge – Linear water way-scour depth. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.

BOX CULVERT: General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.

BRIDGE BEARINGS :

General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.

UNIT - II

DECK SLAB BRIDGE :

Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only by courbans method.

UNIT - III

BEAM & SLAB BRIDGE (T-BEAM BRIDGE)

General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only by courbans method.

UNIT – IV

PLATE GIRDER BRIDGE :

Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.

COMPOSITE BRIDGES :

Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders' including shear connectors

UNIT V

PIERS & ABUTMENTS:

General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on

abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design).

TEXT BOOKS :

1. Design of Bridges Structure by D.J.Victor, Oxford Pubilishers.
2. Design of Bridges Structure by T.R.Jagadish & M.A.Jayaram Prentice Hall of India Pvt., Delhi.
3. Design of Bridges by N.Krishnam Raju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.

REFERENCE :-

1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Bridge Engineering by Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi.
3. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
4. Relevant – IRC & Railway bridge Codes.

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GEOTECHNICAL ENGINEERING – II

Objective: *To use the principles of Soil mechanics to design the foundations, Earth retaining structures and slope stability safely and economically knowledge of the subject is essential.*

UNIT – I

SOIL EXPLORATION: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report.

UNIT – II

EARTH SLOPE STABILITY: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

UNIT – III

EARTH PRESSURE THEORIES: Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Rebhann's and Culmann's graphical method

RETAINING WALLS: Types of retaining walls – stability of retaining walls.

UNIT – IV

SHALLOW FOUNDATIONS: Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff's and Skempton`s Methods

ALLOWABLE BEARING PRESSURE : Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures – Settlement Analysis

UNIT –V

PILE FOUNDATION: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

WELL FOUNDATIONS: Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts.

TEXT BOOKS:

1. Geotechnical Engineering by C.Venkataramaiah, New Age Pubilications.

2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi
3. Soil Mechanics and Foundations by – by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCES:

1. Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson Engineering
2. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
3. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
4. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.
5. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

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TRANSPORTATION ENGINEERING – II

OBJECTIVE: *It deal with different components of Transportation Engineering like Railway , Airport Engineering & harbours. Sound knowledge can aquire on components of airports, docks and harbours.*

UNIT – I

RAILWAY ENGINEERING:

Introduction – permanent way components – cross section of permanent way – functions and requirements of rails, sleepers and ballast – types of gauges – creep of rails – theories related to creep – coning of wheels – adzing of sleepers – rail fastenings.

UNIT – II

GEOMETRIC DESIGN OF RAILWAY TRACK:

Gradients – grade compensation – cant and negative super elevation – cant deficiency – degree of curves – safe speed on railway track – points and crossings – layout and functioning of left hand turn out and right hand turn outs – station yards – signaling and interlocking.

UNIT –III

AIRPORT ENGINEERING:

Airport site selection – factors affecting site selection and surveys- runway orientation – wind rose diagram – basic runway length – correction for runway length – terminal area – layout and functions – concepts of terminal building – simple building , linear concept, pier concept and satellite concept – typical layouts .

UNIT – IV

GEOMETRIC DESIGN OF RUNWAYS AND TAXIWAYS:

Aircraft characteristics – influence of characteristics on airport planning and design – geometric design elements of runway – standards and specifications as per - functions of taxiways – taxiway geometric design – geometric elements and standard specifications – runway and taxiway lighting.

UNIT – V

PORTS AND HARBOURS:

Requirements of ports and harbours – types of ports – classification of harbours – docks and types of docks – dry docks, wharves and jetties – breakwaters: layouts of different types of harbours and docks – dredging operations – navigation aids.

Text books:

1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi.
2. Satish Chandra and Agarwal, M.M. (2007) "Railway Engineering" Oxford Higher Education, University Press New Delhi.
3. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros.
4. A Text book of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. – (2001).
5. Railway Track Engineering by J.S.Mundrey

References:

1. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian, Scitech pubilishers.
2. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing House Pvt. Limited, 2009
3. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza, Chartor Publishers pvt ltd.

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BUILDING CONSTRUCTION & MANGEMENT
(OPEN ELECTIVE)

Objective: The objective of the course is to make the student to understand about fundamentals of construction management and techniques to be used to perform and complete the construction works intime by saving time and money.

UNIT - I

FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY :

Definitions and Discussion – Construction Activities – Construction Processes - Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations.

PREPARATORY WORK AND IMPLEMENTATION

Site layout – Infrastructure Development – Construction Methods – Construction Materials – Deployment of Construction Equipment – Prefabrication in Construction – Falsework and Temporary Works.

UNIT - II

EARTHWORK :

Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging.Rock Excavation – Basic Mechanics of Breakage – Blasting Theory – Drillability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting.

UNIT - III

PROJECT MANAGEMENT AND BAR CHARTS AND MILESTONE CHARTS :

Introduction – Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT net work problems.

UNIT - IV

ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK :

Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems

– Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure –Hierarchies – Illustrative examples – Problems.

UNIT - V

PERT AND CPM: TIME COMPUTATIONS & NETWORK ANALYSIS

Introduction – Uncertainties : Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time Problems -Earliest expected time – Formulation for T_E - Latest allowable occurrence time – Formulation for T_L - Combined tabular computations for T_E and T_L problems.Introduction - Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems – CPM : process – CPM : Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for T_E and T_L - Start and f inish times of activity – Float – Critical activities and critical path – Illustrative examples Problems.

TEXT BOOKS :

1. Construction project management by Jha ,Pearson pubilications,New Delhi.
2. Construction Technology by Subir K.Sarkar and Subhajit Saraswati – Oxford Higher Education- Univ.Press, Delhi.
3. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi.

REFERENCES:

1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
2. Total Project management, the Indian context- by : P.K.JOY- Mac Millan Publishers India Limited.

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DISASTER MANAGEMENT AND MITIGATION
(OPEN ELECTIVE)

Objective:-The objectives of this are to give the basic knowledge of Environmental Hazards and disasters. The syllabus includes the basics of Endogenous and Exogenous hazard's and gives a suitable picture on the different types of hazards.

Unit-I

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

Unit –II

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards –

Unit–III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

Unit –IV

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters Infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes , distribution human adjustment, perception & mitigation)Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves.Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation).Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion

Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion.Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes.Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation.Biological hazards/ disasters:- Population Explosion.

Unit –V

Emerging approaches in Disaster Management- Three Stages

1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

Text books:

1. Disaster Management by Rajib Shah, Universities Press, India, 2003
2. Disaster Mitigation: Experiences And Reflections by Pardeep Sahni
3. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning

References

1.Kates,B.I & White, G.F The Environment as Hazards, oxford, New York, 1978

2.R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000

3.H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003

4.R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994

5.Dr. Satender , Disaster Management t in Hills, Concept Publishing Co., New Delhi, 2003

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ARCHITECTURAL AND TOWN PLANNING
(OPEN ELECTIVE)

Objective:- To know the western architecture and Indian architecture and also to gain knowledge on the principles of architectural design and historical background of town planning.

A) ARCHITECTURE:

UNIT-I

History of Architecture:

a) **Western Architecture:** Egyptian, Greek, Roman Architectures; influences- Comparative Analysis Orders.

b) **Indian Architecture:** Vedic age - Indus Valley civilization - Buddhist period; stambas, Slenstas. Roranas, Chaityans, Viharas with one example for each Hindu temples - Evaluation of Dravidian and Indo Aryan Styles - Principle factors. Temple of Aibole, Mahabalipuram, Madurai, Deograph, Bhuvaneshwar, Mount Abu.

c) Indo - Sarsanic Architecture; Mosque - Place- Fort Tomb.

UNIT - II

Architectural Design:

a) **Principle of designing** : Composition of plan Relationship between plan and elevation elements, form, surface Mass, Texture, Color, Tone.

b) **Principle of Compositions:** Unity, contrast, proportion, scale, Bab Rhuthm, character.

Principles of Planning a Residence; Site Orientation prospect, Grouping, circulation, privacy, services and other factors.

UNIT – III

Introduction of Post-classic Architecture and contribution of eminent architects to modern

period.

Brief summary of post - classic architecture - Indian and Western Architectural contribution of Edward Lutyens, Le Corbusier), Frank Lloyd Wrigt, Walter Groping, Vender Rohe, Caarihan, Nervi, Oscar Niemyer, Edward Durell stone.

B) TOWN PLANNING:

UNIT – IV

Historical Back Ground:

Town planning in India - town plans of Magad - town plans of ancient Indian towns; Mourya, Pataliputra vijayanagara, Delhi.Town planning in the West-town plans of Acropolis, Rome, Paris, London.

UNIT – V

Components of Planning;

a) Zoning
b) Roads and road Traffic.
a) Housing-Slums, Parks, Play grounds.
b) Public Utility Services.
c) Surveys and maps for planning.
d) Neighbourhood Planning.

Planning New town, planning standards, National and regional Planning, town planning and legislation.

Garden cities and satellite town

REFERENCES:

A) ARCHITECTURE

1. Indian Architecture – Vol:- I and II by Percy Brown, Taraporevala Publications, Bombay.
2. Planning and 'Design of Building -Section of Architecture by Y.S.Sane.
3. Modern Architecture and Design by Nikolans, Pevshar.
4. Modern Ideal Hol11nes for India by R.S.Deshpande.

B) TOWN PLANNING

1. Town and Country .Planning - A.J.Brown and H.M.Sherrard.
2. Town Design .- Federik Gibbard, Architectural press, London.
3. National Building Code of India.
4. Town Planning in India - Town and Country Planning Organisation, New Delhi 1962.
5. Regional Planning - Misra R.P., Mysore University.
6. Urban and Regional Planning; Principles and case studies by K.S.Rama Gouda, Mysore University Publications.
7. Town and Country Planning - P. Abercrombe, Oxford University press.

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INTELLECTUAL PROPERTY RIGHTS
(OPEN ELECTIVE)

Objectives:The objective of the course is to make the student to understand about various trades and laws regarding registration and patents.

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks : Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents : Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets : Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition : Misappropriation right of publicity, False advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law ; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah. E. Bouchoux, cengage learing.
2. Intellectual property right – nleashmy the knowledge economy, prabuddha ganguli,
Tate Mc Graw Hill Publishing company ltd.,

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CAD LAB

CAD:
SOFTWARE:
1. STAAD PRO or Equivalent

EXCERCISIES:
1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. Column Analysis & Design

TEXT BOOK:
1.Computer Aided Design Lab Manual by Dr.M.N.Sesha Prakash And Dr.C.S.Suresh , Lakshmi Pubilishers

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	0	**3**	**2**

HIGHWAY MATERIALS LAB

I. ROAD AGGREGATES:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS :

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

TEXT BOOKS:-

1. Lab manual in High way Engineering by Ajay.K.Duggal & Vijay .P.Puri, New Age pubilications,New Delhi
2.Relevant IS Codes

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ADVANCED STRUCTURAL ENGINEERING

OBJECTIVE: *To make the student more conversant with the design principals of multistoried buildings, roof system, foundation and other important structures.*

1. Design of a flat slab(Interior panel only)
2. Design of concrete bunkers of circular shape – (excluding staging) – Introduction to silos
3. Design of concrete chimney
4. Design of circular and rectangular water tank resting on the ground
5. Design of cantilever and counter forte retaining wall with horizontal back fill

FINAL EXAMINATION PATTERN:

The question paper shall contain 2 questions of either or type covering all the syllabus where each question carries 35 marks out of 35 marks, 20 marks shall be for the design and 15 marks are for the drawing.

TEXT BOOKS :-

1. Structural Design and drawing (RCC and steel) by Krishnam Raju, Universites .Press , New Delhi
3. R.C.C Structures by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi
4. Advanced RCC by Varghese , PHI Publications, New Delhi.
5. Design of RCC structures by M.L.Gambhir P.H.I. Publications, New Delhi.

Reference books :-

1. R.C.C Designs by Sushil kumar , standard publishing house.
2. Fundamentals of RCC by N.C.Sinha and S.K.Roy, S.Chand Publications, New Delhi.

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DESIGN AND DRAWING OF IRRIGATION STRUCTURES

OBJECTIVE: *To make the student more detail studies about irrigation structures and its component parts.*

Design and drawing of the following irrigation structures.

1. Sloping glacis weir
2. Surplus weir.
3. Tank sluice with tower head
4. Type III Syphon aqueduct.
5. Canal regulator.

Final Examination pattern: Any two questions of the above Five designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

TEXT BOOKS:

1. Water Resources Engineering by Satyanarayana Murthy. Challa, New Age International Publishers.
2. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wiley eastern Ltd.
3. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard Book House.

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ADVANCED FOUNDATION ENGINEERING
(ELECTIVE –II)

OBJECTIVE: *To make the student about shallow and deep foundation and its importance in selection of foundation in problematic soils.*

UNIT - I

SHALLOW FOUNDATIONS:

General requirements of foundations. Types of shallow foundations and the factors governing the selection of a type of shallow foundation. Bearing capacity of shallow foundations by Terzaghi's theory and Meyerhof's theory (derivation of expressions and solution to problems based on these theories). Local shear and general shear failure and their identification.

Bearing capacity of isolated footing subjected to eccentric and inclined loads. Bearing capacity of isolated footing resting on stratified soils-Button's theory and Siva Reddy analysis.

UNIT - II

ANALYSIS AND STRUCTURAL DESIGN OF R.C.C. FOOTINGS:

Analysis and structural design of R.C.C. isolated, combined and strap footings.

UNIT - III

DEEP FOUNDATIONS:

Pile foundations-types of pile foundations. Estimation of bearing capacity of pile foundation by dynamic and static formulae. Bearing capacity and settlement analysis of pile groups. Negative skin Friction, Pile load tests.

Well foundations – elements of well foundation. Forces acting a on a well foundation. Depth and bearing capacity of well foundation. Design of individual components of well foundation (only forces acting and principles of design). Problems associated with well sinking.

UNIT - IV

SHEET PILE WALLS:

Cantilever sheet piles and anchored bulkheads, Earth Pressure diagram, Determination of depth of embedment in sands and clays-Timbering of Trenches – Earth Pressure Diagrams – Forces in struts.

DESIGN OF UNDER REAMED PILES FOUNDATIONS:

Under reamed piles-principle of functioning of under reamed pile-Analysis and structural design of under reamed pile.

UNIT - V

FOUNDATIONS IN PROBLEMATIC SOILS :

Foundations in black cotton soils- basic foundation problems associated with black cotton soils. Lime column techniques – Principles and execution. Use of Cohesive Non Swelling (CNS) layer below shallow foundations.

TEXT BOOKS :

1. Analysis and Design of Foundations and Retaining Structures- Shamsher Prakash, Gopal Ranjan and Swami Saran, Meerut : Sarita Prakashan, 1979.
2. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
3.Geotechnical Engg. – C.Venkatramaiah. New age International Pvt . Ltd, (2002).

REFERENCES:-

1. Analysis and Design of Foundations – E.W.Bowles, TMH Publications.
2. Foundation engineering by Brije.M.Das, Cengage pubilications,New Delhi.
3. Foundations Design and Construction – Tomlinson, PHI Pubilications.
4. Foundation Design-Teng, PHI Pubilications..

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REMOTE SENSING AND GIS
(ELECTIVE –II)

Objective:-The objectives of this are to give the basic knowledge of Remote Sensing and GIS Techniques and its applications in civil engineering.

UNIT – I

INTRODUCTION TO PHOTOGRAMMETRY:

Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II

REMOTE SENSING:

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III

GEOGRAPHIC INFORMATION SYSTEM:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

TYPES OF DATA REPRESENTATION:

Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT – IV

GIS SPATIAL ANALYSIS:

Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V

WATER RESOURCES APPLICATIONS:

Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics.

Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

1 Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi.
2 Advanced surveying : Total station GIS and remote sensing – Satheesh Gopi – Pearson publication.
3 Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4 Fundamentals of remote sensing by Gorge Joseph, Universities press, Hyderabad.

REFERENCES:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Remote sensing and GIS by M.Anji reddy ,B.S.Pubiliications,New Delhi.
3. Remote Sensing and its applications by LRA Narayana University Press 1999.
4. GIS by Kang – tsung chang, TMH Publications & Co.,
5. Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell, Oxford Publishers 2004

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REHABILITATION AND RETROFITING OF STRUCTURES
(ELECTIVE –II)

OBJECTIVES: The main objective of this subject is to give knowledge on causes of failures in buildings and remedial measures to control & repair the damages by adopting rehabilitation techniques.

UNIT – I

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage

UNIT – II

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

UNIT – III

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT.

UNIT – IV

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT – V

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

TEXT BOOKS:

1. Concrete Technology by A.R. Santakumar, Oxford University press
2. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.

REFERENCES

1. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
2. Diagnosis and treatment of structures in distress by R.N.Raikar, Published by R&D Centre
   of Structural Designers & Consultants Pvt.Ltd., Mumbai, 1994.
3. Handbook on Repair and Rehabilitation of RCC buildings, Published by CPWD, Delhi,2002.
4. Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006.

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EXPERIMENTAL STRESS ANALYSIS
(ELECTIVE –III)

OBJECTIVES: The main objective of this subject is to give knowledge on stress developed in the structural bodies during loading and methods to evaluate stress by using available techniques.

UNIT – I

PRINCIPLES OF EXPERIMENTAL APPROACH :

Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods – Simplification of problems.

UNIT – II

STRAIN MEASUREMENT USING STRAIN GAUGES :

Definition of strain and its relation of experimental Determinations Properties of Strain Gauge Systems-Types of Strain – Gauge Systems-Types of Strain Gauges – Mechanical, Acoustic and Optical Strain Gauges.Inductance strain gauges – LVDT – Resistance strain gauges – various types – Gauge factor – Materials of adhesion base etc.

UNIT – III

STRAIN ROSETTES :

Introduction – The three element Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge.

UNIT – IV

NON-DESTRUCTIVE TESTING :

Ultrasonic Pulse Velocity method – Application to Concrete – hammer Test Application to Concrete.

BRITTLE COATING METHODS :

Introduction – Coating Stress – Failure Theories – Brittle Coating Crack Patterns – Crack Detection – Types of Brittle Coating – Test Procedures for Brittle Coating Analysis – Calibration Procedures – Analysis of Brittle Coating Data.

UNIT – V

THEROY OF PHOTOELASTICITY :

Introduction – Temporary Double refraction – The stress Optic Law – Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster's Stress Optic law.

TWO DIMENSIONAL PHOTOELASTICITY :

Introduction – Isochramic Fringe patterns – Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

Text Books :

1. Experimental stress analysis by J.W.Dally and W.F.Riley, McGraw Hill Pubilications
2. Experimental stress analysis by Dr.Sadhu Singh.Khanna Pubilishers, New Delhi

Reference Books

1. Experimental stress analysis by U.C.Jindal, Pearson Pubilishers,New delhi
2. Experimental stress analysis by Abdul Mubeen, Dhanpati rai Pubilications

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

B.Tech. IV -II sem (C.E.)	**T**	**P**	**C**
	3+1*	**0**	**3**

PRESTRESSED CONCRETE
(ELECTIVE –III)

OBJECTIVES: The main objective of this subject is to give idea on methods available on pre stressed concrete and analysis of pre stressed members and design of members.

UNIT – I

INTRODUCTION:

Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

METHODS OF PRESTRESSING:-

Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT – II

LOSSES OF PRESTRESS:-

Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of stress in steel, slip in anchorage ,bending of member and wobble frictional losses.

UNIT – III

ANALYSIS & DESIGN OF SECTIONS FOR FLEXURE;-

Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

UNIT – IV

DESIGN OF SECTION FOR SHEAR :

Shear and Principal Stresses – Design for Shear in beams.

COMPOSITE SECTION:

Introduction – Analysis of stress – Differential shrinkage – General designs considerations.

UNIT – V

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS:

Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long term deflections.

TEXT BOOKS:

1. Prestressed Concrete by N. Krishna Raju; - Tata Mc.Graw HillPublications.
2. Prestressed Concrete by Ramamrutham,Dhanpatrai Publications
3. Prestressed Concrete by N.Rajagopalan, Narosa publications.

REFERENCE:

1. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.
2. Fundamentals of prestressed concrete by SK Roy , S.Chand Pubilications.
3. Prestressed Concrete Analysis & Design Fundamentals,Antoine E Naaman,Mcgraw-hill Pubilishers.

Codes/Tables:

Codes: BIS code on prestressed concrete, IS 1343 to be permitted into the examination Hall.

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

B.Tech. IV - II sem (C.E.)	**T**	**P**	**C**
	3+1*	**0**	**3**

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
(ELECTIVE – III)

OBJECTIVES: The main objective of this subject is to give knowledge on seismic loads and designing of buildings to withstand seismic forces.

UNIT – I

INTRODUCTION TO STRUCTURAL DYNAMICS : – Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

UNIT – II

MULTI-DEGREE OF FREEDOM (MDOF) SYSTEMS : - Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

UNIT – III

EARTHQUAKE ANALYSIS : - Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi-storyed buildings – Use of response spectra.Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

UNIT – IV

EARTHQUAKE ENGINEERING : - Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelegrams.Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column and joints

UNIT – V

ASEISMIC PLANNING : - Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings.

SHEAR WALLS : - Types – Design of Shear walls as per IS:13920 – Detailing of reinforcements.

TEXT BOOKS:

1. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi.
2. Dynamics of Structures – Clough & Penzien, McGraw Hill – International Edition.
3. Earthquake Resistant Design of Structures by S.K.Duggal, Oxford University press, New Delhi

REFERENCES:

1. Structural Dynamics by Mario Paaz , Academic Pubilishers.
2. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Printice Hall of India, New Delhi
3. Earthquake Tips by C.V.R.Murty, I.I.T. Kanpur.
4. Earthquake Hazardous Mitijation by R.Ayothiraman and Hemanth Hazarika, I.K.International Publishing House Pvt.Ltd., New Delhi.

Codes/Tables:

IS Codes: IS:1893, IS:4326 and IS:13920 to be permitted into the examinations Hall.

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Course Structure for Civil Engineering
B.Tech(Regular)
(For batches admitted from the year 2015)

I YEAR **I SEMESTER**

CODE	Subject		L	P	Credits
15A55101	Theory	English	4	--	4
15A51101	Theory	Mathematics-I	4	--	4
15A53101	Theory	Engineering Chemistry	4	--	4
15A01101	Theory	Environmental Studies	4	--	4
15A01102	Theory	Engineering Mechanics	4	--	4
15A53103	Practical	Engineering Chemistry Lab	--	4	2
15A35101	Practical	Engineering Workshop & IT workshop	--	4	2
15A55102	Practical	English Language Communication Skills Lab	--	4	2
	Total		**20**	**12**	**26**

I YEAR **II SEMESTER**

CODE	Subject		L	P	Credits
15A55201	Theory	Technical Communication presentation skills	4	--	4
15A51201	Theory	Mathematics-II	4	--	4
15A52201	Theory	Engineering Physics	4	--	4
15A05201	Theory	Problem Solving & Computer Programming	4	--	4
15A01201	Theory	Building Materials and Construction	4	--	4
15A03202	Theory	Engineering Graphics	4	--	4
15A05202	Practical	Computer Programming Lab	--	4	2
15A52202	Practical	Engineering Physics Lab	--	4	2
	Total		**24**	**8**	**28**

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II B.Tech– I Sem

CODE	Subject		**L**	**P**	Credits
15A51301	Theory	Mathematical Methods	4	0	4
15A23301	Theory	Electrical and Mechanical Technology	4	0	4
15A01301	Theory	Strength of Materials - I	4	0	4
15A01302	Theory	Surveying – I	4	0	4
15A01303	Theory	Fluid Mechanics	4	0	4
15A01304	Theory	Building Planning & Drawing	4	0	4
15A54302	Audit Course	Human Values & Professional Ethics	2	0	0
15A01305	Practical	Surveying Lab – I	0	4	2
15A01306	Practical	Strength of Materials Lab	0	4	2
	Total		26	8	28

II B.Tech– II Sem

CODE	Subject		**L**	**P**	Credits
15A51401	Theory	Probability & Statistics	4	0	4
15A01401	Theory	Strength of Materials – II	4	0	4
15A01402	Theory	Hydraulics & Hydraulic Machinery	4	0	4
15A54401	Theory	Managerial Economics & Financial Analysis (MEFA)	4	0	4
15A01403	Theory	Structural Analysis – I	4	0	4
15A01404	Theory	Surveying – II	4	0	4
15A01405	Practical	Fluid Mechanics & Hydraulic Machinery Lab	0	4	2
15A01406	Practical	Surveying Lab - II	0	4	2
	Total		24	8	28

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III B.Tech **I Sem**

Code No	Subject		**L**	**P**	Credits
15A01501	Theory	Design of Steel Structures	4	0	4
15A01502	Theory	Concrete Technology	4	0	4
15A01503	Theory	Environmental Engineering	4	0	4
15A01504	Theory	Water Resources Engineering –I	4	0	4
15A01505	Theory	Structural Analysis – II	4	0	4
15A01506	Theory	Engineering Geology	4	0	4
15A01507	Practical	Engineering Geology Lab	0	4	2
15A01508	Practical	Concrete Technology Lab	0	4	2
15A55501	Audit Course	Advanced Communication skills lab	0	4	0
	Total		24	12	28

III B.Tech- **II Sem**

Code No	Subject		**L**	**P**	Credits
15A01601	Theory	Design of Reinforced Concrete Structures	4	0	4
15A01602	Theory	Geotechnical Engineering – I	4	0	4
15A01603	Theory	Transportation Engineering – I	4	0	4
15A01604	Theory	Water Resources Engineering – II	4	0	4
15A01605	Theory	Estimation, Costing & Valuation	4	0	4
15A01606a 15A01606b 15A01606c	Theory	OPEN ELECTIVE 1. Experimental Stress Analysis 2. Environmental Impact Assessment & Management 3. Industrial Waste & Waste water Management	4	0	4
15A01607	Practical	Geotechnical Engineering Lab	0	4	2
15A01608	Practical	Environmental Engineering Lab	0	4	2
	Total		24	8	28

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

IV B.Tech I Sem

Code No	Subject		**L**	**P**	Credits
15A01701	Theory	Finite Element Analysis	4	0	4
15A01702	Theory	Bridge Engineering	4	0	4
15A01703	Theory	Geotechnical Engineering – II	4	0	4
15A01704	Theory	Transportation Engineering – II	4	0	4
15A01705	Theory	Cost Effective Housing Techniques	4	0	4
15A01706	Theory	Elective-I (Through MOOC)	4	0	4
15A01707	Practical	CAD Lab	0	4	2
15A01708	Practical	Highway Materials Lab	0	4	2
15A01709	Project	Project Work Part-A	0	2	0
	Total		24	10	28

IV B.Tech – II Sem

Code No	Subject		**L**	**P**	Credits
15A01801a 15A01801b 15A01801c	Theory	Elective-II 1. Advanced Structural Engineering 2.Building Construction Management 3.Water Harvesting and Conservation	4	0	4
15A01802a 15A01802b 15A01802c	Theory	Elective-III 1.Design & Drawing of Irrigation Structures 2.Advanced Foundation Engineering 3.Architecture and Town planning	4	0	4
15A01803a 15A01803b 15A01803c	Theory	Elective-IV 1.Rehabilitation & Retrofitting of structures 2.Urban Transportation Planning 3.Remote Sensing & GIS	4	0	4
15A01804a 15A01804b 15A01804c	Theory	Elective-V 1.Air Pollution & Control 2.Prestressed Concrete 3.Earth Quake Resistant Structures	4	0	4
15A01805		Seminar	0	4	2
15A01806	Project	Project Work Part-B	0	20	10
	Total		16	24	28

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A55101
I Year B.Tech (Civil Engineering) - I Semester

L	P	C
4	0	4

ENGLISH

1. INTRODUCTION:

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of engineering and technology. The prescribed books serve the purpose of preparing them for everyday communication and to face the global competitions in future.

The first text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and student-centered. They should be encouraged to participate in the classroom activities keenly.

The text for non-detailed study is meant for extensive reading/reading for pleasure by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

2. OBJECTIVES:

1. To enable the students to communicate in English for academic and social purpose
2. To enable the students to acquire structure and written expressions required for their profession.
3. To develop the listening skills of the students
4. To inculcate the habit of reading for pleasure
5. To enhance the study skills of the students with emphasis on LSRW skills

3. SYLLABUS:

UNIT –I

Chapter entitled *Humour* from "Using English"
Chapter entitled '*Homi Jehangir Bhabha'* from "New Horizons"

L- Listening -Techniques - Importance of phonetics
L- Meet & Greet and Leave taking, Introducing Oneself and Others (Formal and Informal situations)
R- -Reading Strategies -Skimming and Scanning
W- Writing strategies- sentence structures
G-Parts of Speech –Noun-number, pronoun-personal pronoun, verb- analysis
V-Affixes-prefix and suffix, root words, derivatives

UNIT –II

Chapter entitled *Inspiration* from "Using English"
Chapter entitled 'My Struggle for an Education' from "New Horizons"

L- Listening to details
S- Apologizing, Interrupting, Requesting and Making polite conversations
R-note making strategies
W- Paragraph-types- topic sentences, unity, coherence, length , linking devices
G-Auxiliary verbs and question tags
V- synonyms-antonyms, homonyms , homophones, homographs, words often confused

UNIT –III

Chapter entitled *Sustainable Development* from "Using English"
Chapter entitled 'The Autobiography of Abraham Lincoln' from "New Horizons"

L- Listening to themes and note taking
S- Giving instructions and Directions, making suggestions, Accepting ideas, fixing a time and Advising
R- Reading for details -1
W- Resume and cover letter
G- Tenses – Present tense, Past tense and Future tense
V-Word formation and One-Word Substitutes

UNIT –IV

Chapter entitled *Relationships* from "Using English"
Chapter entitled ' T*he Happy Prince* from "New Horizons"

L- Listening to news
S- Narrating stories, Expressing ideas and opinions and telephone skills
R- Reading for specific details and Information
W- Technical Report writing-strategies, formats-types-technical report writing
G- Voice and Subject – Verb Agreement
V- Idioms and prepositional Phrases

UNIT –V

Chapter entitled Science and Humanism from "Using English"
Chapter entitled 'If'from "New Horizons"
L- Listening to speeches
S- Making Presentations and Group Discussions
R- Reading for Information
W- E-mail drafting
G- Conditional clauses and conjunctions
V- Collocations and Technical Vocabulary and using words appropriately

4.EXPECTED OUTCOME:

The students will get the required training in LSRW skills through the prescribed texts and develop communicative competence

Prescribed Books:

1. **Using English (for detailed study)** published by Orient Black Swan, 2013
2. **New Horizons** published by Pearson, 2013

SUGGESTED READING:

1. **Raymond Murphy's English Grammar with CD,** Murphy, Cambridge University

Press, 2012.
2. **English Conversation Practice –**Grant Taylor, Tata McGraw Hill, 2009.
3. **Communication Skills, Sanjay Kumar & Pushpalatha** Oxford University Press, 2012.
4. **A Course in Communication Skills**- Kiranmai Dutt & co. Foundation Books, 2012.
5. **Current English grammar and usage**-S M Guptha, PHI, 2013.
6. **Modern English Grammar**-Krishna SWAMI .McMillan, 2009.
7. **Powerful Vocabulary Builder**- Anjana Agarwal New Age International Publishers, 2011.
8. **Writing with a Purpose, Tickoo and Sasi Kumar, OUP, 2011**
9. **Strengthen Your Writing, Orient Blackswan**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A51101

I Year B.Tech-I semester	**L**	**P**	**C**
	4	**0**	**4**

MATHEMATICS – I
(Common to All Branches)

Objectives

- To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications.
- To prepare students for lifelong learning and successful careers using mathematical concepts of differential and Integral calculus, ordinary differential equations and vector calculus.
- To develop the skill pertinent to the practice of the mathematical concepts including the students abilities to formulate and modeling the problems, to think creatively and to synthesize information.

UNIT – I

Exact, linear and Bernoulli equations, Applications to first order equations.

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x), method of variation of parameters, linear equations with variable coefficients: Euler-Cauchy Equations, Legendre's linear equation. Applications of linear differential equations- Mechanical and Electrical oscillatory circuits and Deflection of Beams.

UNIT – II

Taylor's and Maclaurin's Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrange's method of undetermined Multipliers with three variables only. Radius of curvature, center of curvature, Involutes, evolutes and envelopes..

UNIT – III

Curve tracing – Cartesian, polar and parametric curves. Length of curves, surface area of solid of revolution (single integrals)

UNIT – IV

Multiple integral – Double and triple integrals – Change of Variables – Change of order of integration. Applications to areas and volumes in Cartesian and polar coordinates using double and triple integral.

UNIT – V

Vector Calculus: Gradient – Divergence – Curl and their properties; Vector integration – Line integral - Potential function – Area – Surface and volume integrals. Vector integral theorems: Green's theorem – Stoke's and Gauss's Divergence Theorem (Without proof). Application of Green's, Stoke's and Gauss's Theorems.

TEXT BOOKS:

1. Engineering Mathematics-I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher
2. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.

REFERENCES:

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publication.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

Outcomes:

- The students become familiar with the application of differential and integral calculus, ordinary differential equations and vector calculus to engineering problems.

- The students attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A53101

I Year B.Tech-I semester	**L**	**P**	**C**
	4	**0**	**4**

ENGINEERING CHEMISTRY
(Common to C.E, ME)

Knowledge in chemistry serves as basic nutrient for the understanding and thereby design of materials of importance in life. Thus the advancement in Engineering is depend on the outcome of basic sciences. Many advances in engineering either produce a new chemical demand as in the case of polymers or wait upon chemical developments for their applications as in the case of implants and alloys. Currently the electronics and computer engineers are looking forward for suitable biopolymers and nano materials for use in miniature super computers, the electrical materials engineers are in search of proper conducting polymers, the mechanical engineers are on lookout for micro fluids and the civil engineers are looking for materials that are environmental friendly, economical but long lasting.

COURSE OBJECTIVES (CO):

- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, engineering materials and water chemistry.

UNIT.1
ELECTROCHEMISTRY

i).Review of electrochemical cells, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries), Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen)

ii).Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples: analysis of Glucose and urea

iii).Corrosion: definition, Types of Corrosion: Dry Corrosion (Direct Chemical attack), Wet Corrosion, Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention: Anodic and catholic protection and electro and electroless plating. (10h)

UNIT.2

POLYMERS

i).Introduction to polymers, Polymerisation process, mechanism:cationic, anionic, free radical and coordination covalent. Elastomers - Natural Rubber; Compounding of Rubber

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, buna-N, Polyurethene, Polysulfide (Thiokol) rubbers.

Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications , PVC, Bakelite, nylons. Elastomers (rubbers)

ii).Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.

iii).Liquid Crystals: Introduction, classification and applications

iii).Inorganic Polymers: Basic Introduction, Silicones, Polyphospazins (-(R)2-P=N-) applications.(12h)

UNIT.3

FUEL TECHNOLOGY

i).Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

ii).Liquid Fuels:

Petroleum: Refining of Petroleum, Gasoline: Octane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis - Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

iii). Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus, Solving of problems on Combustion. (12h)

UNIT.4

CHEMISTRY OF ENGINEERING MATERIALS

i).Ceramic: General properties, classification.

ii).Glass: Manufacture of glass, properties of glass, fracture of glasses, types of glasses.

iii).Cement: Composition, Setting and Hardening (Hydration and Hydrolysis)

iv).Refractories: Classification, properties and applications

v).Lubricants: Theory of lubrication, properties of lubricants and applications

vi). Rocket Propellants: Classification, Characteristics of good propellant. (9h)

UNIT.5

WATER TREATMENT

Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved

oxygen, Alkalinity, acidity and chlorides in water, Water treatment for domestic purpose (Chlorination, Bleaching powder, ionisation)
Industrial Use of water:
For steam generation, troubles of Boilers: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.
Treatment of Boiler Feed water:
Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment.
External Treatment: Ion-Exchange and Permutit processes.
Demineralisation of brackish water: Reverse Osmosis and Electro dialysis (12h)

TEXT BOOKS:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi
2. A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi

REFERENCES:

1. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapathi Rai Publications, New Delhi
2. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH
Pubblications India Pvt Limited.
3. Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi
4. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu
5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

EXPECTED OUTCOMES (EO): The student is expected to:

- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.
- Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01101

I Year B.Tech (Common to all Branches) - I Semester

L	P	C
4	0	4

ENVIRONMENTAL STUDIES

OBJECTIVE: *To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.*

UNIT – I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: – Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II

ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

SOLID WASTE MANAGEMENT : Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK : Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

TEXT BOOKS :

(1) Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
(2) Environmental Studies by Kaushik, New Age Pubilishers.
(3) Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company

REFERENCES :

(1) Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Pubilications.
(2) Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
(3) Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
(4) Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
(5) A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Pubilishing House
(6) Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01102

I Year B.Tech (Common to Civil, Mechanical, Chemical) - II Semester

L	P	C
4	0	4

ENGINEERING MECHANICS

OBJECTIVE: *This course will serve as a basic course by introducing the concepts of basic mechanics which will help as a foundation to various courses.*

UNIT – I

INTRODUCTION OF ENGINEERING MECHANICS – Basic concepts - System of Forces – Moment of Forces and its Application – Couples and Resultant of Force System – Equilibrium of System of Forces - Degrees of Freedom – Free body diagrams –Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT – II

FRICTION : Types of friction– laws of Friction – Limiting friction- Cone of limiting friction– static and Dynamic Frictions – Motion of bodies – Wedge, Screw jack and differential Screw jack.

UNIT – III

CENTROID AND CENTER OF GRAVITY: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies – Area moment of Inertia - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures.

MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids – Moment of Inertia of composite masses.(Simple problems only)

UNIT – IV

KINEMATICS: Rectilinear and Curvilinear motion – Velocity and Acceleration – Motion of A Rigid Body – Types and their Analysis in Planar Motion.

KINETICS : Analysis as a particle and Analysis as a Rigid Body in Translation – Central Forces of motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies – Work Energy Method – Equation for Translation – Work Energy application to Particle Motion, Connection System – Fixed axis Rotation and Plane Motion.

UNIT – V

ANALYSIS OF PERFECT FRAMES: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

MECHANICAL VIBRATIONS: Definitions, Concepts-Simple Harmonic motion-Free vibrations-Simple Compound and Torsional pendulum- Numerical problems

TEXT BOOKS:

(1) Engineering Mechanics by Dr.R.k.Bansal, Lakshmi Publications.
(2) Engineering Mechanics by Shames & Rao – Pearson Education.
(3) Engineering Mechanics by Bhavakatti, New age pubilishers

REFERENCES:

(1) Engineering Mechanics by Seshigiri Rao, Universities Press, Hyderabad.
(2) Engineering Mechanics – B. Bhattacharyya, Oxford University Publications.
(3) Engineering Mechanics by Fedrinand L.Singer – Harper Collings Publishers.

(4) Engineering Mechanics (Statics and Dynamics) by Hibller and Gupta; Pearson Education
(5) Engineering Mechanics by S.Timoshenko, D.H.Young and J.V.Rao, Tata McGraw-Hill Company
(6) Engineering Mechanics by Chandramouli, PHI publications.
(7) Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A53103

I Year B.Tech-I semester	**L**	**P**	**C**
	0	**4**	**2**

ENGINEERING CHEMISTRY LAB

The experiments are designed in a manner that the students can validate their own theory understanding in chemistry by self involvement and practical execution. Thus the execution of these experiments by the student will reinforce his/her understanding of the subject and also provide opportunity to refine their understanding of conceptual aspects. As a result, the student gets an opportunity to have feel good factor at the laboratory bench about the chemical principles that he/she learned in the classroom.

Programme Objective:

- Will learn practical understanding of the redox reaction
- Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention
- Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications
- Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology

LIST OF EXPERIMENTS

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Copper by Iodometry
5. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Alkalinity of Water
7. Determination of acidity of Water
8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Conductometric titration of Barium Chloride vs Sodium Sulphate (Precipitation Titration)
13. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
14. Estimation of Chloride ion using potassium Chromite indicator (Mohrs method)

(Any 10 experiments from the above list)

Course Outcomes

- **Would be confident in handling energy storage systems and would be able combat chemical corrosion**
- **Would have acquired the practical skill to handle the analytical methods with confidence.**
- **Would feel comfortable to think of design materials with the requisite properties**
- **Would be in a postion to technically address the water related problems.**

TEXT BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, Pearson
Education.
2. Chemistry Practical – Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A35101

I Year B.Tech-I semester	**L**	**P**	**C**
	0	**4**	**2**

Engineering Workshop& IT Workshop Lab

1. TRADES FOR EXERCISES :

At least 2 exercises In each :

1. Carpentry
2. Fitting
3. House-wiring
4. Black Smithy
5. Tin smithy
6. Power Tools Demonstration

TEXT BOOK:

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/ Scitech Publishers.

Objective : The objective of this subject is to provide the basic concepts about different manufacturing processes and use of various workshop tools the exposer to the Power tools used in the inclusion

Codes / Tables : Nil

Question Paper pattern : Test in any two out of 6 trades

IT Workshop
(Common to All Branches)

Course Objectives

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching

Course Outcomes

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer.

- Prepare spread sheets for calculations using excel.

Preparing your Computer

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc.

If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

References:

1. Introduction to Computers, Peter Norton, Mc Graw Hill
2. MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A55102

I Year B.Tech-I semester	**L**	**P**	**C**
	0	**4**	**2**

English Language Communication Skills (ELCS) Lab

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

OBJECTIVES:

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To expose the students to a varied blend of self-instructional learner-friendly modes of language learning through computer-aided multi-media instruction.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

SYLLABUS:

UNIT- I

Phonetics – Introduction to Sounds of Speech – Vowels – Consonants – Phonetic Transcription & Orthographic Transcription

UNIT – II

Syllabification – Word Stress – Rules of word stress – Intonation – Falling tone and Rising tone

UNIT – III

Situational Dialogues – Role-play – Expressions in various situations – Self Introduction – Introducing others – Greetings – Apologies – Requests – Social and Professional etiquettes – Telephone Etiquettes

UNIT – IV

JAM – Describing object/person/place/situation – Giving directions

UNIT – V

Debates and Group Discussions

EXPECTED OUTCOMES:

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students
- Speaking with clarity and confidence thereby enhancing employability skills of the students

MINIMUM REQUIREMENT FOR ELCS LAB:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab:

   The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

System Requirement (Hardware component):
Computer network with LAN with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor
   a) Speed – 2.8 GHZ
   b) RAM – 512 MB Minimum
   c) Hard Disk – 80 GB
ii) Headphones of High quality

SUGGESTED SOFTWARE:

1. Walden Infotech English Language Communication Skills.
2. Clarity Pronunciation Power – Part I (Sky Pronunciation)
3. Clarity Pronunciation Power – part II
4. K-Van Advanced Communication Skills
5. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
6. *DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.*
7. Lingua TOEFL CBT Insider, by Dreamtech
8. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
9. Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:

1. **A Textbook of English Phonetics for Indian Students** 2nd Ed T. Balasubramanian. (Macmillian), 2012.
2. **A Course in Phonetics and Spoken English**, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
3. **Speaking English Effectively**, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
4. **A Hand book for English Laboratories**, E.Suresh kumar, P.Sreehari, Foundation Books,2011
5. **English Pronunciation in Use. Intermediate & Advanced**, Hancock, M. 2009. CUP
6. **Basics of Communication in English**, Soundararaj, Francis. 2012.. *New Delhi: Macmillan*
7. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.
8. **English Pronouncing Dictionary**, Daniel Jones Current Edition with CD.Cambridge, 17th edition, 2011.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A55201

I Year B.Tech-II semester	**L**	**P**	**C**
	4	**0**	**4**

TECHNICAL COMMUNICATION & PRESENTATION SKILLS

PREAMBLE:

In the increasingly globalized world, technical communication and presentation skills are assuming great importance. Industries and employers constantly complain that young engineers have adequate technical knowledge, but no communication and presentation skills. Success is defined these days in terms of possessing these skills. The syllabus has been designed to develop communicative competencies of the students.

OBJECTIVES:

1. To develop awareness in students of the relevance and importance of technical communication and presentation skills.
2. To prepare the students for placements
3. To provide students with interactive practice sessions to make them internalize these skills

UNIT 1:
Basics of Technical Communication – Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication - LSRW Skills – Barriers to effective communication

UNIT II
Informal and Formal Conversation - Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

UNIT III
Written communication – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication

UNIT IV
Presentation Skills – Nature and importance of oral presentation – Defining the purpose – Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing the presentation –Individual and group presentations - Handling stage fright

UNIT V
Interview Skills – The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

OUTCOME

Turning out the students with a clear concept of communication and presentation skills, getting them ready for placements and equipping them with readiness to implement them at work place.

Prescribed Books

1. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, O U Press 2009

Reference Books

1.Communication Skills by Pushpalatha & Sanjay Kumar, Oxford Univsesity Press
2.Books on **TOEFL/GRE/GMAT/CAT/ IELTS** by Barron's/DELTA/Cambridge University Press.2012.
3. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.
4. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
5. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
6.**English for Technical Communication for Engineering Students, Aysha Vishwamohan,**
Tata Mc Graw-Hill 2009.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A51201

I- Year B.Tech. II-Sem	**L**	**P**	**C**
	4	**0**	**4**

MATHEMATICS - II
(Common to All Branches)

Objectives: Our emphasis will be more on conceptual understanding and application of Fourier series, Fourier, Z and Laplace transforms and solution of partial differential equations.

UNIT – I

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function.

Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT – II

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions- Parseval's formula- Complex form of Fourier series.

UNIT – III

Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

UNIT – IV

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.s

UNIT – V

z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.

REFERENCES:

1. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
2. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

Outcomes: The student gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A52201

I- Year B.Tech. II-Sem	**L**	**P**	**C**
	4	**0**	**4**

ENGINEERING PHYSICS
(Common to Civil, Mechanical & Chemical Engg.)

OBJECTIVES:

- To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.
- To understand and employ the concepts of waves & oscillations and acoustics to engineering applications.
- To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications.
- To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications. Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nano and smart materials, their properties and applications in modern emerging technologies are elicited.
- To enlighten the characterization of materials by different techniques, the periodic arrangement of atoms in crystals, Bragg's law and X-Ray diffraction technique.

UNIT 1: PHYSICAL OPTICS, LASERS AND FIBRE OPTICS

Physical Optics*:* Introduction to interference – Colours in thin films – Newton's Rings – Michelson interferometer - Fraunhoffer diffraction due to single slit, double slit – Diffraction grating.

Lasers*:* Introduction – Characteristics of laser – Spontaneous and stimulated emission of radiation –- Einstein's coefficients –– Population inversion – Pumping mechanisms - Ruby laser – He-Ne laser – Applications of lasers.

Fiber optics: Introduction – working principle of optical fiber – Numerical aperture and acceptance angle – Types of optical fibers –Optical fiber communication system – Attenuation and losses in optical fibers – Applications of optical fibers.

UNIT 2: **WAVES & OSCILLATIONS AND ACOUSTICS**

Waves & Oscillations*:* Categories of waves: Mechanical, electromagnetic, matter and gravitational – Reflection and transmission of waves at a boundary – Free oscillations – Damped Oscillations – Forced oscillations – Resonance – Coupled oscillations.

Acoustics*:* Sound absorption – Absorption coefficient and its measurement – Reverberation time – Sabine's formula – Eyring's formula.

UNIT 3: **DIELECTRICS AND MAGNETIC MATERIALS**

***Dielectrics**:* Introduction – Dielectric Polarization – Types of Polarization – Lorentz field – Clausius- Mosotti equation – Dielectric strength, loss, breakdown.

***Magnetic materials**:* Introduction – Basic definitions – Origin of magnetic moment – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials – Hysteresis – Soft and hard magnetic materials – Applications of magnetic materials.

UNIT 4: **ADVANCED MATERIALS**

***Superconductors**:* Introduction – Properties of superconductors – Meissner effect– Type I and Type II superconductors – ac and dc Josephson effects – BCS theory (qualitative treatment) – High T_c superconductors – Applications of superconductors.

Nanomaterials: Introduction – Significance of nanoscale – Surface area and quantum confinement – Physical properties: optical, thermal, mechanical and magnetic – Carbon nanotubes & their properties – Applications of nanomaterials.

Smart Materials: Shape Memory Alloys: Definition – Two phases – One way and two way memory effect – Pseudo elasticity – Applications
of shape memory alloys.

UNIT 5: MATERIAL CHARACTERIZATION AND CRYSTALLOGRAPHY

Material Characterization: Electron microscopy: SEM, TEM, AFM – UV-Visible and IR Spectroscopy – Non-destructive testing: objectives – Methods: Pulse-echo method.

***Crystallography**:* Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction – Bragg's law – Laue method.

Prescribed Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S.Chand and Company
2. Engineering physics – S. Mani Naidu, Pearson Education
3.Instrumental methods of analysis - Willard and Meritt

Reference Books:

1. Introduction to modern optics – Grant R Fowles
2. A text book on Optics – Brijlal & Subramanyam
3. Laser Fundamentals – William T. Silfvast, Cambridge University Press
4. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
5. Introduction to Nanotechnology – C P Poole and F J Owens, Wiley
6. Shape Memory Alloys-Modeling and Engg. Applications – C Lagoudas, Springer
7. Hand Book of Non-destructive evaluation, C.J.Hellier, McGraw-Hill
8. Engineering Physics – V. Rajendran, K.Thyagarajan Tata MacGraw Hill Publishers
9. Engineering Physics – M.R.Srinivasan, New Age Publications
10. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
11. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
12. Engineering Physics – M. Arumugam, Anuradha Publications

OUTCOMES:

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fiber optics.

- The concepts of types of waves and oscillations ,acoustics are highlighted
- The dielectric and magnetic response of materials are focussed.
- The importance of superconducting materials, nano and smart materials along with their engineering applications are well elucidated.
- Characterization of materials by advanced techniques, the important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction technique are focused.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A05201

I- Year B.Tech. II-Sem	**L**	**P**	**C**
	4	**0**	**4**

Problem Solving and Computer Programming
(Common to All Branches)

Course Objectives:

- To understand the various steps in Program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs
- To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures.
- To understand the notations used to analyze the Performance of algorithms.
- To understand and analyze various searching and sorting algorithms.

Course Outcomes:

- Able to design the flowchart and algorithm for real world problems
- Able to learn and understand new programming languages
- Able to construct modular and readable programs
- Able to write C programs for real world problems using simple and compound data types
- Adapt programming experience and language knowledge to other programming language contexts
- Employee good programming style, standards and practices during program development

UNIT - I

Introduction: Programs and Programming, Programming Languages, Compiler, Interpreter, Loader and Linker, Program Execution, Classification of Programming, Structured Programming Concept, Algorithms, Flowcharts, System Developments.

Fundamentals Algorithms: Exchange the Values between two variables, Counting, Summation of set of numbers, Factorial Computation, Generation of the Fibonacci sequence, Reversing the digits of a integer.

Basics Of C: Introduction**,** Developing Programs in C, A Simple C program, Parts of C Program Revisited.

UNIT – II

Structure of C: Structure of a C Program, Concept of a Variable, Data Types in C, Program Statements, Declaration, Tokens, Operators and Expressions, Type conversion in C.

Input and Output: Introduction, Basic Screen and Keyboard I/O in C, Non-Formatted Input and Output, Formatted Input and Output Function.

Control Statements: Introduction, Specifying Test Condition for Selection and Iteration, Writing Test Expression, Conditional Execution and Selection, Iteration and Repetitive Execution. Nested Loops.

UNIT – III

Arrays And Strings: Introduction, One-Dimensional Array, Strings, Multidimensional Arrays, Arrays of Strings.

Function: Introduction, Concept of Functions, Using Functions, Call by Value Mechanism, Working with Functions, Passing Arrays to Functions, Scope and Extent, Inline Function, Recursion.

UNIT - IV

Factoring Methods: Finding Square root of a Number, The Smallest Deviser of an Interger, The GCD of Two Integers, Generating Prime Numbers.

Pointers – Introduction, Understanding Memory, Address Operator, Pointer, Void Pointer, Null Pointer, Use of pointer, Arrays and Pointers, Pointers and string, Pointers and string, Pointers to pointers, Array of pointers, Pointers to Function, Dynamic Memory Allocation,.

UNIT – V

User-Defined Data Types and Variables: Introduction, User-defined Data Types, Structures, Union, Enumeration Types.

Files in C: Introduction, Using Files in C, Working with text Files, Working with Binary Fields, Direct File Input and Output, Files of Records, Random Access to Files of Records.

TEXT BOOKS:

1. Programming in C, Pradip Dey, Manas Ghosh, Second Edition, OXFORD,
2. How to Slove it by Computer by R.G. Dromey, Pearson.

REFERENCES:

1. Programming in C and Data Structures, Jeri R. Hanly, Elliot B. Koffman, Ashok Kamthane and A.Ananda Rao, Pearson Education.
2. C Programming with problem solving, J.A. Jones & K. Harrow, dreamtech Press
3. Programming In C, Remma Teraja, Second Edition OXFORD.
3 Programming in C – Stephen G. Kochan, III Edition, Pearson Eductaion.
3. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition
4. Education / PHI
5. C Programming & Data Structures,E.Balagurusamy,TMH.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01201

I- Year B.Tech. II-Sem	**L**	**P**	**C**
	4	**0**	**4**

BUILDING MATERIALS & CONSTRUCTION

OBJECTIVES: *To give the students a basic idea about the traditional and modern construction materials a brief knowledge on building components and its construction methodologies.*

UNIT – I

INTRODUCTION TO BUILDING MATERIALS

Traditional & Organic Building Materials – Stone – Dressing of Stones – Modern Building Materials – Bricks – Manufacturing process – Ceramic Products – Manufacturing Process – Building Materials for Low Cost Housing – Utilisation of Wastes for Alternative Building Materials –Sustainable Materials in Construction –National Standards.

UNIT – II

GLASS:

Introduction – Functions of Glass in Buildings – Constituents and Classification of Glass – Manufacturing Process –Properties of Glass – Common Types of Glass – Special Glass – Advantages and Disadvantages of Glass – National Standards.

PLASTIC:

Introduction – Polymerisation – Classification of Plastics – Commonly Used Plastics – Moulding and Fabricating for Plastic Products – Applications – Advantages – Disadvantages – Intelligent Use of Plastics in Buildings – National Standards.

UNIT – III

INSULATING MATERILAS

Thermal Insulating Materials: Introduction – Thermal Insulation – Heat Transfer Fundamentals – Thermal Properties of Insulating Materials – Selection of Insulating Materials – Classification of Insulation materials – Reflective Insulation Systems – Commonly Used Building Insulation Materials – Insulation that Should not be Used – National Standards.

Sound Insulating Materials: Introduction – Basics of Acoustics – Sound Absorption or Insulation – Green Insulation – National Standards.

UNIT – IV

STRUCTURAL COMPONENTS:–

Foundations – classification of Foundations – consideration in selection of foundation types – Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars – Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures – Components – Construction Procedure – Panel walls – National Standards.

UNIT – V

INTERNAL CONSTRUCTION AND FINISHES

Internal elements – Internal walls – Construction joints – Internal walls, fire protection – separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door sets – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of

Paints – Types of Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints – Emulsion Paints – Whitewash and Colourwash – Application of Paints –Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards.

TEXT BOOKS:

1. Building Material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
3. A Textbook on Building Construction by S.K.Sharma, S.Chand Pubilishers.
4. Building Materials by M.L.Gambhir, TMH Pubilishers.

REFERENCES:

1. Building construction by W.B.Mckay, Vol.I, II, III & IV Pearson Publications, 2013 edition.
2. R.Chudly "Construction Technology "– Volumes I and II" 2nd Edition, Longman, UK, 1987.
3. Building materials by S.C.Rangawala, Charotar Pubilishing House, Anand- INDIA.
4. Building Construction by S.C.Rangawala, Charotar Pubilishing House, Anand-INDIA
5. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
6. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A03202

I- Year B.Tech. II-Sem	**L**	**P**	**C**
	4	**0**	**4**

ENGINEERING GRAPHICS
(CIVIL, EEE, ECE, CSE & CHEMICAL)

Unit-I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance Drawing Instruments and their Use – BIS Conventions in drawing and Lettering.

Curves used in practice:

a) Conic sections including the Rectangular Hyperbola
b) Cycloid, Epicycloid and Hypocycloid –Normals and Tangents
c) Involute of a circle –Normals and Tangents

Principles of orthographic projection, I and III angle projections –Conventions –Projections of points.

Unit –II

Projection of lines inclined to both planes –traces, Projection of plane figures inclined to both planes.

Unit –III

Projection of simple solids inclined to both planes.

Unit –IV

Sections and Developments: Sections and Sectional views of Regular solids –Prism, Cylinder, Pyramid, Cone – True shapes.

Unit –V

Isometric projections: Principles of pictorial representations-Isometric projection- Isometric scale-Isometric views- conventions- Isometric views of plane figures, solids-Isometric projection of objects with non isometric lines-Isometric projection of spherical parts.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai.

REFERENCES:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers.
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal/New age Publishers
4. Engineering Graphics, John&john.

Suggestions:

Student is expected to buy a book mentioned under 'Text books' for better understanding.
Student should prepare rough sketches for all the problems given at the end of each chapter to improve his / her imaginations.

Student should also practice Auto CAD or any other drawing software to help understanding better.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A05202

I- Year B.Tech. II-Sem	**L**	**P**	**C**
	0	**4**	**2**

Computer Programming Lab
(Common to All Branches)

Course Objective

- To work with the compound data types
- To explore dynamic memory allocation concepts
- Able to design the flowchart and algorithm for real world problems
- Able to write C programs for real world problems using simple and compound data types
- Employee good programming style, standards and practices during program development

Course Outcomes

- Able to have fundamental concept.
- Able to write, compile and debug programs in C language.
- Able to formulate problems and implement algorithms in C.
- Able to effectively choose programming components that efficiently solve computing problems in real-world.
- Able to use different data types in a computer program.
- Able to design programs involving decision structures, loops and functions.

Week-1

1) Write a C program to make the following exchange between the variables a-> b -> c->d - > a
2) Write a C program to carry out the arithmetic operations addition, subtraction, multiplication, and division between two variables
3) Write a C program for printing prime numbers between 1 and n.

Week-2

1) Write a C program to construct a multiplication table for a given number.
2) Write a program to reverse the digit of a given integer.
3) Write a C program to find the sum of individual digits of a positive integer.
4) Write a C program to calculate the factorial of a given number

Week-3

1) Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
2) Write a program to calculate tax, given the following conditions:
    a) If income is less than 1,50,000 then no tax.
    b) If taxable income is in the range 1,50,001 – 300,000 then charge 10% tax
    c) If taxable income is in the range 3,00,001 – 500,000 then charge 20% tax
    d) If taxable income is above 5,00,001 then charge 30% tax

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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Week-4

1) Write a program to print the calendar for a month given the first Week- day of the month.
   Input the first day of the month (Sun=0,Mon=1,Tue=2,Wed=3,.....) :: 3
   Total number of days in the month : 31
   Expected output

Sun	*Mon*	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*
-	-	-	*1*	*2*	*3*	*4*
5	*6*	*7*	*8*	*9*	*10*	*11*
12	*13*	*14*	*15*	*16*	*17*	*18*
19	*20*	*21*	*22*	*23*	*24*	*25*
25	*26*	*27*	*28*	*29*	*30*	*31*

2) Write a C program to find the roots of a quadratic equation

Week-5

1) Write a program to print the Pascal triangle for a given number
2) Write a C program to find the GCD (greatest common divisor) of two given integers
3) Write a C program to construct a pyramid of numbers.
4) Write C code to define a function cash_dispense, which takes an amount as its input, and returns the number of 1000, 500, 100, 50, 20, 10, 5, 2, 1 rupee denomination that make up the given amount

Week-6

1) Write C code to reverse the contents of the array. For example, [1,2,3,4,5] should become [5,4,3,2,1]
2) Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices
   ii) Multiplication of Two Matrices
3) Write a program that will search and find out the position where the given key element exist in a user chosen array and print it as output.

Week-7

1) Write C code to compute the frequency table of survey responses given by 20 users. The survey responses range from 1 to 5 and are stored in an array. For example, 10 responses are stored in the array [1,1,5,2,3,3,5,5,2,2]. The frequency table will be as shown below:
   a. 1 = 2
   b. 2 = 3
   c. 3 = 2
   d. 4 = 0
   e. 5 = 3
2) Write a program to define a function to sort an array of integers in ascending order by using exchange sort.

Week-8

1) Write a C program to check whether a given string is a palindrome or not, without using any built-in functions.
2) Write a C program to determine if the given string is a palindrome or not by using string functions.
3) Write a function that accepts a string and delete the first character.
4) Write a function that accepts a string and delete all the leading spaces.

Week-9 Write a program to accept a string from user and display number of vowels, consonants, digits and special characters present in each of the words of the given string.

Week-10

1) Write a C program to define a union and structure both having exactly the same numbers using the sizeof operators print the sizeof structure variables as well as union variable

2) Declare a structure *time* that has three fields *hr, min, secs.* Create two variables,*start_time*and*end_time.* Input there values from the user. Then while *start_time* is not equal to *end_time* display GOOD DAY on screen.

Week-11

1) Write a program to read in an array of names and to sort them in alphabetical order. Use sort function that receives pointers to the functions strcmp, and swap, sort in turn should call these functions via the pointers.
2) Write a program to read and display values of an integer array. Allocate space dynamically for the array using the *malloc().*
3) Write a program to calculate area of a triangle using function that has the input parameters as pointers as sides of the triangle.

Week-12

1) Two text files are given with the names text1 and text2. These files have several lines of text. Write a program to merge (first line of text1 followed by first line of text2 and so on until both the files reach the end of the file) the lines of text1 and text2 and write the merged text to a new file text3.
2) Write a program to split a given text file into n parts. Name each part as the name of the original file followed by .part<**n**> where n is the sequence number of the part file.

Reference Books:

1. Computer Science, A Structured Programming Approach Using C by Behrouz A. Forouzan& Richard F. Gilberg, Third Edition, Cengage Learning
2. C Programming A Problem-Solving Approach, Behrouz A. Forouzan& E.V. Prasad, F. Gilberg, Third Edition, Cengage Learning
3. Programming with C RemaTheraja, Oxford
4. "C Test Your Skills", Kamthane, Pearson Education
5. Programming in C: A Practical Approach, Ajay Mittal, Pearson
6. Problem solving with C, M.T.Somasekhara, PHI
7. C Programming with problem solving, J.A. Jones & K. Harrow,Dreamtech Press
8. Programming withc, Byron S Gottfried, Jitender Kumar Chhabra, TMH, 2011

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A52202

I- Year B.Tech. II-Sem	**L**	**P**	**C**
	0	**4**	**2**

ENGINEERING PHYSICS LABORATORY

Any EIGHT of the following experiments has to be performed during the SEMESTER

1. Determination of wavelengths of various colours of mercury spectrum using diffraction grating in normal incidence method
2. Determination of dispersive power of prism
3. Determination of thickness of thin object by wedge method
4. Determination of radius of curvature of lens by Newton's rings
5. Laser : Diffraction due to single slit
6. Laser : Diffraction due to double slit
7. Laser: Determination of wavelength using diffraction grating
8. Determination of Numerical aperture of an optical fiber
9. Meldes experiment: Determination of the frequency of tuning fork
10. Sonometer: Verification of the three laws of stretched strings
11. Energy gap of a material using p-n junction diode
12. Electrical conductivity by four probe method
13. Hall effect: Determination of mobility of charge carriers in semiconductor
14. B-H curve
15. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method
16. Determination of dielectric constant and Curie temperature of a ferroelectric material

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code: 15A51301

II Year B.Tech. I-Sem	**L**	**P**	**C**
	4	**0**	**4**

MATHEMATICAL METHODS

Objectives:

- This course aims at providing the student with the concepts of Matrices, Numerical Techniques and Curve fitting.

UNIT – I

Elementary row transformations-Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations. Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonolization of matrix. Calculation of powers of matrix and inverse of a matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

UNIT – II

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method, Solution of linear simultaneous equation: Crout's triangularisation method, Gauss - Seidal iteration method.

UNIT – III

Interpolation: Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

UNIT – IV

Curve fitting: Fitting of a straight line – Second degree curve – Exponentional curve-Power curve by method of least squares. Numerical Differentiation for Newton's interpolation formula. Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – V

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods. Numerical solutions of Laplace equation using finite difference approximation.

TEXT BOOKS:

3. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
4. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.

REFERENCES:

2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
3. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S. Chand publication.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

Outcomes: The student will be able to analyze engineering problems using the concepts of Matrices and Numerical methods.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code: 15A23301

II Year B.Tech. I-Sem	**L**	**P**	**C**
	4	**0**	**4**

ELECTRICAL & MECHANICAL TECHNOLOGY

PART – A

ELECTRICAL TECHNOLOGY

Objective:
Electrical Technology contains basic Circuits, DC generators & motors, Transformers, Induction motors and their performance aspects will be studied.

UNIT – I Introduction to DC & AC Circuits
Ohm's Law, Basic Circuit Components, Kirchhoff's Laws, Types of Sources, Resistive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Principle of AC Voltages, Waveforms and Basic Definitions, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, The J Operator and Phasor Algebra, Analysis of Ac Circuits With Single Basic Network Element, Single Phase Series.

UNIT-II DC Machines
D.C Generators: Principle of Operation of Dc Machines, Types of D.C Generators, E.M.F Equation in D.C Generator, O.C.C. of a D.C. Shunt Generator
D.C Motors: Principle of Operation of Dc Motors, Types of D.C Motors, Torque Equation, Losses and Efficiency Calculation in D.C Motor- Swinburne's Test

UNIT-III AC Machines
Transformers: Principles of Operation, Constructional Details, Losses and Efficiency, Regulation of Transformer, Testing: OC & SC Tests.
Three Phase Induction Motors: Principle of Operation, Slip and Rotor Frequency, Torque (Simple Problems).
Alternators: Principle of Operation-Constructional Details-EMF Equation-Voltage Regulation by Synchronous Impedance Method.
OUTCOME:
After going through this course the student gets a thorough knowledge on basics of Electrical Circuits, DC Machines, Transformers, Induction motors & Alternators with which he/she can able to apply the above conceptual things to real-world problems and applications.

TEXT BOOKS:
1. Basic Electrical Engineering, M.S.Naidu and S. Kamakshiah, Mc Graw Hill Education.
2. Basic Electrical Engineering, T.K.Nagasarkar and M.S. Sukhija, Oxford University Press.
REFERENCES:
1. Theory and Problems of Basic Electrical Engineering, D.P.Kothari & I.J. Nagrath, PHI.
2. Principles of Electrical Engineering, V.K Mehta, S.Chand Publications.
3. Fundamentals of Electrical Electronics Engineering 5th Edition, T.Thyagarajan, SCITECH Publications 2007

4. Electrical and Electronic Technology, Hughes, Pearson Education.

PART – B

MECHANICAL TECHNOLOGY

UNIT – I

WELDING PROCESSES: Introduction to welding classification of welding processes, Oxyacetylene welding – equipment, welding fluxes and filler rods, Gas cutting, Introduction to are welding – Manual metal are welding. Submerged are welding, TIG and MIG processes, soldering and brazing Importance, comparison and applications.

UNIT - II

Description and working of steam engines and steam turbines (Prime movers) – impulse and Reaction turbines. Description and working of I.C. Engines – 4 stroke and 2 stroke engines – comparison – Gas Turbines – Closed and open type gas turbines.

Reciprocating Air compressors – description and working of single stage and multistage reciprocating air compressors – inter cooling. Transmission of power; Belt, Rope, Chain and gear drive-simple problems.

UNIT - III

Block diagram of a vapour compression refrigeration system. Names of common refrigerates. Basic principles of air-conditioning. Room and General air conditioning systems Ducting – Different types of ventilation system. Earth moving machinery and Mechanical handling equipment – bull dozers – power showels – Excavators – concrete mixer – Belt and bucket conveyers.

TEXT BOOKS :

1. Elements of Mechanical Engineering by S.N.Lal, Cengage Learning, 2013
2. Elements of Mechanical Engineering by S.Trymbaka Murthy, Universities Press, 2015
3. Manufacturing Technology, P.N. Rao, TMH

REFERENCE BOOKS

1. Pneumatics by Jagadeesha University Press,2015

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01301

II Year B.Tech (Civil Engineering) – I Semester **L P C**
4 0 4

STRENGTH OF MATERIALS - I

OBJECTIVE: *The subject provide the knowledge of simple stress strains flexural stresses in members, shear stresses and deflection in beams so that the concepts can be applied to the Engineering problems.*

UNIT – I

SIMPLE STRESSES AND STRAINS : – Deformable bodies - Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

Strain energy **–** Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT – II

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

FLEXURAL STRESSES : Theory of simple bending – Assumptions – Derivation of bending equation: M/I =f/y = E/R – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections.

UNIT – IV

DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods.

Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L. uniformly varying load-Mohr's theorems – Moment area method – application to simple cases including overhanging beams-deflections of propped cantilevers for simple loading cases.

UNIT – V

CONJUGATE BEAM METHOD: Introduction – Concept of conjugate beam method. Difference between a real beam and a conjugate beam. Deflections of determinate beams with constant and different moments of inertia.

DIRECT AND BENDING STRESSES : Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and bending moment about both axis.

TEXT BOOKS :

(1) Mechanics of Materials – Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.

(2) Strength of Materials by R.K Rajput, S.Chand & Company Ltd.
(3) Strength of Materials by B.S.Basavarajaiah, Universities Press, Hyderabad.
(4) Strength of Materials by Dr.R.K.Bansal, Lakshmi Publications.

REFERENCES:

1. Strength of Materials by Ghosh & Datta, New Age Pubilishers
2. Strength of Materials by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.
3. Strength of materials by A.R.Basu, Dhanpathi Rai & Co, New Delhi.
4. Strength of materials by Sadhu Singh, Khanna Pubilications, NewDelhi.
5. Strength of materials by Surendar Singh, CBS Pubilications.
6. Strength of Materials by – R.Subaramanian, Oxford university pubilishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01302

II Year B.Tech (Civil Engineering) – I Semester	**L**	**P**	**C**
	4	**0**	**4**

SURVEYING - I

OBJECTIVE: *To ensure that the student develops knowledge of the basic and conventional surveying instruments, principles behind them, working of the instruments, plotting of the area from the field measurements, determination of the area and the theory behind curves.*

UNIT – I

BASIC CONCEPTS: Surveying – History; Definition; primary divisions, Classification, Principles of surveying Plan and map; Basic Measurements; Instruments and Basic methods; units of measurement, Scales used for Maps and plans, Duties of a surveyor. Errors: Accuracy and Precision Sources and types of errors, theory of Probability, Rounding of numbers.

CHAIN SURVEYING: Instruments for chaining, Ranging out, chaining a line on a flat ground; Chaining on an uneven or a sloping ground; Chain & Tape corrections; Degree of accuracy. Principles of chain surveying; Basic definitions; Well-Conditioned Triangle, Field book, Field work; Offsets, Cross Staff survey; obstacles in chain survey-problems, Conventional signs.

UNIT-II

COMPASS SURVEY: Introduction, Bearings and angles, Designation of bearings, Conversion of bearings from one system to the other, fore bearing and back bearing, , Calculation of bearing from angles, Theory of Magnetic compass (i.e. Prismatic compass), Temporary adjustments of compass-Magnetic Declination, Local attraction-Related Problems-Errors in compass survey.

PLANE TABLE SURVEYING: Introduction, Accessories, Working operations, Methods of plane tabling, Three point problem-Mechanical method -Graphical method, Two point problem, Errors in plane tabling.

UNIT-III

LEVELLING: Introduction, basic definitions, methods of leveling, leveling instruments: dumpy level, levelling staff, Temporary adjustments of dumpy level, theory of simple and differential leveling, Level field book, Classification of direct leveling methods, Reciprocal leveling, Profile leveling and Cross sectioning, Curvature and Refraction, Difficulties in leveling, errors in leveling, Degree of Precision.

CONTOURING: Introduction, contour interval, Characteristics of contours Methods of locating contours - Direct and indirect methods; Interpolation and sketching of contours, Contour gradient-Uses of contour maps.

UNIT-IV

THEODOLITE: Vernier Theodolite: Basic definitions; Fundamental lines and desired relations; Temporary adjustments; Measurement of a horizontal angle; Repetition and Reiteration methods of horizontal angle measurement. Measurement of vertical angle; Sources of errors in Theodolite survey.

TRAVERSE SURVEYING: Introduction, Selection and marking of traverse stations, methods of traversing, traversing by free needle and fast needle method, traversing by direct observation of angles, checks in closed traverse, closing error, methods of balancing the traverse, Gale's traverse table, Omitted measurements.

UNIT-V

COMPUTATION OF AREAS AND VOLUMES: methods of determining areas, areas by sub-division into triangles, areas from offsets to a base line: regular and irregular intervals, area by double meridian distances, area by co-ordinates. embankments and cutting for a level section, two level sections, three level section and multi level section, volume of earth work from contour plan, capacity of a reservoir , volume of barrow pits.

MINOR INSTRUMENTS: uses and working of the minor instruments: hand level, line ranger, optical square, abney level, clinometers, pantagraph, sextant and planimeter.

TEXT BOOKS:

(1) Surveying (Vol – 1,2 &3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) Ltd., New Delhi
(2) Text book of surveying by C.Venkataramaiah, Universities Press.
(3) Advanced Surveying by Satheesh Gopi, R.Shanta Kumar and N.Madhu, Pearson education.

REFERENCES:

(1) Chandra AM, "Plane Surveying", New age International PVt.Ltd., Publishers, New Delhi, 2002
(2) Duggal S.K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co.Ltd. New Delhi, 2004.
(3) Arora K R "Surveying (Vol-1 & 2), Standard Book House, Delhi, 2004
(4) Surveying and Levelling by Kanetkar T.P., and Kulkarni, Vols. I and II, United Book Corporation, Pune, 1994
(5) Surveying and leveling by R.Subramaniah, Oxford university press, New Delhi.
(6) Surveying by Mimi Das Saikia, PHI Pubilications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01303

II Year B.Tech (Civil Engineering) – I Semester	**L**	**P**	**C**
	4	**0**	**4**

FLUID MECHANICS

OBJECTIVE: *This subject introduces the basic concepts of fluids, their behavioural properties, analyzing the fluid flows using primary equations. This subject further deals with various flow measuring devices and concepts of boundary layer flows.*

UNIT – I

INTRODUCTION: Dimensions and units – physical properties of fluids, specific gravity, viscosity, surface tension and capillarity, vapor pressure and their influences on fluid motion. Newtonian and non Newtonian fluids. Fluid Pressure at a Point; Pascal's law, Hydrostatic law, Atmospheric, Absolute and gauge pressure; Hydrostatic paradox, Pressure measurement manometers; Simple, differential and Micro Manometers

HYDROSTATIC FORCES ON SURFACES: Total Pressure and Centre of Pressure: on Horizontal Plane Surface; Vertical Plane Surface; Inclined Plane Surface and Curved Surfaces.

UNIT-II

BUOYANCY: Buoyancy; Buoyant Force and Centre of Buoyancy, Stability of submerged bodies and floating bodies; Metacentre and metacentric height, analytical method for metacentric height.

KINEMATICS OF FLUID MOTION: Methods of describing fluid motion; Classification of flow; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one dimensional flows; Irrotational and rotational flows; Streamline; Pathline; Streakline; Equation for acceleration; Convective acceleration; Local acceleration; Continuity equation; Velocity potential and stream function; Flownet; Vortex flow – free vortex and forced vertex flow.

UNIT-III

DYNAMICS OF FLUID FLOW: Forces acting on a Fluid in Motion; Euler's equation of motion; .Bernoulli's equation ; Energy correction factor; Momentum principle; Force exerted on a pipe bend.

FLOW MEASUREMENTS IN PIPES: Discharge through Venturi Meter; Discharge through Orifice Meter; Discharge through flow nozzle; Measurement of velocity by Pitot tube,pitot-static tube.

UNIT-IV

FLOWTHROUGH ORIFICES AND MOUTHPIECES: Flow through Orifices: Classification of Orifices; Determination of coefficients for an Orifice Flow through large rectangular Orifice; Flow through submerged Orifice – fully sub-merged and Partially sub-merged. Classification of Mouthpieces; Flow through external and internal cylindrical Mouthpiece

FLOW OVER NOTCHES & WEIRS: Classification of Notches and Weirs; Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Cipolletti weir, Broad crested weir.

UNIT-V

ANALYSIS OF PIPE FLOW: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length; Hydraulic power transmission through a pipe; Siphon; Pipes in series, parallel & branched pipes.

LAMINAR & TURBULENT FLOW IN PIPES: Reynolds's experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe(Hazen poiseuille equation). Characteristics of turbulent flow, Prandtl's mixing length theory, Hydro dynamically smooth and rough boundaries, Velocity distribution, Friction factor for pipe flow.

TEXT BOOKS:

(1) Fluid Mechanics by Modi and Seth, Standard book house.
(2) A text of Fluid mechanics and hydraulic machines by Dr.R.k.Bansal – Laxmi Publications (P) Ltd., New Delhi.
(3) Fluid Mechanics and Machinery by D.Rama Durgaiah, New Age International.

REFERENCES:

(1) Fluid Mechanics and Machinery, CSP Ojha, Oxford Higher Education
(2) Fluid mechanics and machinery by Garde, New Age Pubilishers.
(3) Theory and applications of fluid mechanics by K.Subramanyam, TMH Pubilications, New Delhi.
(4) Principles of Fluid Mechanics and Fluid Machines by M.Narayana Pillai, Universities Press.
(5) Introduction to Fluid Machines by S.K.Som & G.Biswas .Tata Mc.Grawhill publishers PVt.Ltd.
(6) Fluid Mechanics by A.K.Mohanty, Prentice Hall of India PVt.Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01304

II Year B.Tech (Civil Engineering) II Semester	**L**	**P**	**C**
	4	**0**	**4**

BUILDING PLANNING AND DRAWING 15A01304

OBJECTIVE: *This subject provides the knowledge of building by laws, registration, planning of various types of buildings different sign convention of various Civil Engineering Materials, Doors, windows, tiles of roof, drawing of building plans etc.*

PART-A

UNIT -I

PLANING OF BUILDINGS: Types of buildings, types of residential buildings, site selection for residential building, orientation of buildings; aspect; prospect; privacy; furniture requirement;grouping;circulation;sanitation;lighting;ventilation;cleanliness;flexibility;eleganc y;Economy; practical considerations.

BUILDING BYELAWS AND REGULATIONS: Introduction- Terminology ;Objectives of building byelaws; Minimum plot sizes; Open space requirements ;Plinth area, floor area, carpet area; Floor area ratio (FAR), Floor space Index (FSI) ;areas for different units; Principles underlying building byelaws ; built up area limitations – Height of Buildings ,Wall thickness, lighting and ventilation requirement, safety from fire, drainage and sanitation; applicability of the bye-laws.

UNIT –II

PLANNING OF RESIDENTIAL BUILDINGS: Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings

PLANNING OF PUBLIC BUILDING: Planning of Educational institutions, Hospitals, Office buildings, Banks, Industrial buildings, Hotels and Motels, Hostels, Bus Station.

UNIT -III

BUILDINGS: SAFETY AND COMFORT: aspects of safety-structural, health, fire and constructional safety. Components of building automation system - HVAC, electrical lighting, Security, fire-fighting, communication etc. design for thermal comfort, ventilation comfort, air conditioning comfort, lighting comfort, noise and acoustic comfort.

PART-B

UNIT -IV

SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, and white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond; odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

DOORS WINDOWS, VENTILATORS AND ROOFS: Paneled Door – paneled and glazed door; glazed windows – paneled windows; Swing ventilator – Fixed ventilator; Couple roof – Collar roof; Kind Post truss – Queen post truss.

UNIT –V

Given line diagram with specification to draw plan, section and elevation of:

1. Residential Building
2. Hospital
3. Schools
4. Post office
5. Corporate Office Building
6. Hotels
7. Bank buildings
8. Bus stations
9. Industrial buildings

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part-A and Part-B. Part- A consists of three questions with either or choice from three units in planning portion .Each question carries 10 marks. Total marks for Part-A is 30 marks. Part- B consists of two questions with either or choice from drawing portion. Question from unit-IV carries 10 marks and question from unit-V carries 30 marks. Total marks for Part-B is 40 marks.

TEXT BOOKS:

1. Planning and Designing and Scheduling – Gurucharan Singh and Jagadish Singh- Standard publishers.
2. Building Planning and Design – N.Kumara Swamy and A.Kameswara Rao. Charotar publications.

REFERENCE:

1. Building by laws by state and Central Governments and Municipal corporations. National Building Code
2. Building drawing with an integrated approach to building environment-M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc Graw Hill

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A54302

L	P	C
2	**0**	**0**

HUMAN VALUES AND PROFESSIONAL ETHICS

OBJECTIVE

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of Others

Students will be able to:

- identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
- identify the multiple ethical interests at stake in a real-world situation or practice
- articulate what makes a particular course of action ethically defensible
- assess their own ethical values and the social context of problems
- identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
- demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work
- integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

Unit I: HUMAN VALUES

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy –Self Confidence Character – Spirituality.

Unit II: ENGINEERING ETHICS

Senses of 'Engineering Ethics- Variety of moral issued – Types of inquiry – Moral dilemmas – Moral autonomy –Kohlberg's theory- Gilligan's theory- Consensus and controversy – Models of professional roles- Theories about right action- Self interest - Customs and religion –Uses of Ethical theories – Valuing time –Co operation – Commitment.

Unit III :ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking respect for persons.

UNIT IV: ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk- Safety and the Engineer- Designing for the safety- Intellectual Property rights(IPR).

UINIT V: GLOBAL ISSUES

Globalization – Cross culture issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics and Research – Analyzing Ethical Problems in research – Intellectual property Rights(IPR).

Text Books

1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
3. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill– 2003.
4. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
5. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi
6. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication. Publications.
7. "Professional Ethics and Human Values" by Prof.D.R.Kiran-

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01305

II Year B.Tech (Civil Engineering) – I Semester	**L**	**P**	**C**
	0	**4**	**2**

SURVEYING LAB-I

OBJECTIVE: *To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.*

LIST OF EXERCISES:

(1) Survey of an area by chain survey (Closed traverse) & Plotting
(2) Chaining across obstacles
(3) Determination of distance between two inaccessible points with compass.
(4) Surveying of a given area by prismatic compass (Closed traverse) and plotting after adjustment.
(5) Radiation method, intersection methods by plane Table survey
(6) Two point and three point problems in plane table survey.
(7) Traversing by plane table survey
(8) Fly leveling (differential leveling)
(9) An exercise of L.S. and C.S. and plotting.
(10) Two exercises on contouring.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01306

II Year B.Tech (Civil Engineering) – I Semester	**L**	**P**	**C**
	0	**4**	**2**

STRENGTH OF MATERIALS LAB

OBJECTIVE: *The object of the course to make the student to understand the behavior of materials under different types of loading for different types structures.*

LIST OF EXERCISES:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test.
5. Hardness test.
6. Spring test.
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A51401

II Year B.Tech. II-Sem	**L**	**P**	**C**
	4	**0**	**4**

PROBABILITY AND STATISTICS
(Common for CE, ME, Ch.E,)

Objectives: To help the students in getting a thorough understanding of the fundamentals of probability and usage of statistical techniques like testing of hypothesis, Statistical Quality Control and Queuing theory

UNIT – I

Basic concepts of Probability – Random variables – Expectation – Discrete and continuous Distributions – Distribution functions. Binomial and poison distributions Normal distribution – Related properties.

UNIT – II

Test of Hypothesis: Population and Sample - Confidence interval of mean from Normal distribution - Statistical hypothesis - Null and Alternative hypothesis - Level of significance. Test of significance - Test based on normal distribution - Z test for means and proportions.

UNIT – III

Small samples - t- test for one sample and two sample problem and paired t-test, F-test and Chi-square test (testing of goodness of fit and independence).

UNIT – IV

Statistical Quality Control: Concept of quality of a manufactured product -Defects and Defectives - Causes of variations - Random and assignable - The principle of Shewhart Control Chart-Charts for attribute and variable quality characteristics- Constructions and operation of $\overline{X}$ - Chart, R-Chart,

p - Chart and C-Chart.

UNIT – V

Queuing Theory: Pure Birth and Death process, M/M/1 & M/M/S & their related simple problems.

TEXT BOOKS:

1. Probability & Statistics by E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.
2. Probability & Statistics for engineers by Dr. J. Ravichandran WILEY-INDIA publishers.

REFERENCES:

1. Probability & Statistics by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publications.
2. Statistical methods by S.P. Gupta, S.Chand publications.
3. Probability & Statistics for Science and Engineering by G.Shanker Rao, Universities Press.
4. Probability and Statistics for Engineering and Sciences by Jay L.Devore, CENGAGE.
5. Probability and Statistics by R.A. Jhonson and Gupta C.B.

Outcomes: The student will be able to analyze the problems of engineering & industry using the techniques of testing of hypothesis, Statistical Quality Control and Queuing theory and draw appropriate inferences.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A54401

II Year B.Tech - II Semester

L	P	C
4	0	4

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(w.e.f the academic year: 2015-16.)

Course Objectives: The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to impart analytical skills in helping them take sound financial decisions for achieving higher organizational productivity.

Unit I: INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Demand Analysis: Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting -Relationship of Managerial Economics with Financial Accounting and Management.

UNIT II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function- Least cost combination- Short-run and Long- run production function- Isoquants and Isocosts, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - **Cost Analysis**: Cost concepts and cost behavior- Break-Even Analysis (BEA) -Determination of Break Even Point (Simple Problems)- Managerial significance and limitations of Break- Even Point.

UNIT III: INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization.

UNIT IV: CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Shot term and Long term Capital - Estimating Working Capital Requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

UNIT V: INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping- Journal - Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

The students are required to submit any one of the following- two assignments/ a mini project/submission of any two case studies in the subject.

Learning Outcome: After completion of this course, the student will able to understand various aspects of Managerial Economics and analysis of financial statements and inputs therein will help them to make sound and effective decisions under different economic environment and market situations.

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Ahuja H.L Managerial economics. S.Chand, 3/e, 2013
3.

REFERENCES

1. Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International,. 2013.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01401

II Year B.Tech (Civil Engineering) II Semester	**L**	**P**	**C**
	4	**0**	**4**

STRENGTH OF MATERIALS – II

OBJECTIVE: *Study of the subject provides the understanding of principal stress, strains, springs, columns and structures.*

UNIT – I

PRINCIPAL STRESSES AND STRAINS: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

THEORIES OF FAILURES: Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT – II

THIN CYLINDERS & THICK CYLINDERS : Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – Changes in dia, and volume of thin cylinders – Thin spherical shells.

Introduction Lame's theory for thick cylinders – Derivation of lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

UNIT – III

TORSION OF CIRCULAR SHAFTS – Theory of pure torsion – Derivation of Torsion equations: – Assumptions made in the theory Theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

SPRINGS:

Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple –springs in series and parallel – Carriage or leaf springs.

UNIT – IV

COLUMNS AND STRUTS : Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns – assumptions – derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.

UNIT – V

UNSYMETRICAL BENDING : Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid - Location of neutral axis – Deflection of beams under unsymmetrical bending.

BEAMS CURVED IN PLAN : Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semicircular beam simply-supported on three equally spaced supports.

TEXT BOOKS:

(1) A Text book of Strength of materials by R.K.Bansal – Laxmi Publications (P) Ltd., New Delhi.
(2) Strength of Materials by S.S. Bhavikatti – Vikas publishers
(3) Strength of Materials by R.Subramanian, Oxford University Press.
(4) Strength of Materials by D.S. Prakasa rao, University press.

REFERENCES :

(1) Mechanics of Structures, by Ghosh& Datta, New Age Pubilishers
(2) Strength of Materials by B.C.Punmia.- Laxmi publications
(3) Strength of Materials by Schaum's out line series – Mc.Graw hill International Editions.
(4) Strength of Materials by S.Ramkrishna and R.Narayan – Dhanpat Rai Publications.
(5) Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Dew Delhi.
(6) Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01402

II Year B.Tech (Civil Engineering) II Semester **L P C**

4 0 3

HYDRAULICS AND HYRAULIC MACHINERY

OBJECTIVE: *The main objective of this course is to deal with the concepts of flow through open channels and their applications and the principles of hydraulic machines and hydraulic models.*

UNIT – 1

OPEN CHANNEL FLOW-UNIFORM FLOW: Introduction, Classification of flows, Types of channels; Flow analysis: The Chezy equation, Empirical formulae for the Chezy constant, Hydraulically efficient channel sections: Rectangular, Trapezoidal, Triangular and Circular channels; Velocity distribution; Energy and momentum correction factors. Application of Bernoulli's equation to open channel flow.

OPEN CHANNEL FLOW- NON – UNIFORM FLOW: Concept of specific energy; Specific energy curves; Critical flow; Critical flow in a rectangular channel; Critical slope; discharge curve, Different slope conditions; Channel transitions- Reduction in width of a rectangular channel, Raised bottom in a rectangular channel, venture flume, Momentum principle applied to open channel flow; Specific force; Specific force curve.

UNIT – II

OPEN CHANNEL FLOW- GRADUALLY VARIED FLOW: Introduction, Dynamic equation; Dynamic equation for GVF in wide Rectangular channel, classification of channel bottom slopes, Surface Profiles; Characteristics of surface profiles, Back water Curves and Draw down curves; Examples of various types of water surface profiles; Control section, Computation of surface profiles by single step method.

OPEN CHANNEL FLOW- RAPIDLY VARIED FLOW: Hydraulic jump; Elements and characteristics of hydraulic jump; Hydraulic jump in rectangular channels, height and length of the jump, Energy loss in a hydraulic jump, Types of hydraulic jump; applications of hydraulic jump; Location of hydraulic jump,.

UNIT – III

IMPACT OF JETS: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for

Work done and efficiency-Angular momentum principle, Torque and head transferred in roto dynamic machines.

HYDRAULIC TURBINES-I: Introduction, head and efficiencies of hydraulic turbines, Classification of turbines; pelton wheel: parts, Velocity triangles, work done and efficiency, working proportions, design of pelton wheel. Radial flow reaction turbines: velocity triangles and work done for inward radial flow turbine, degree of reaction, discharge, speed ratio, flow ratio.

UNIT – IV

HYDRAULIC TURBINES-II: Francis turbine: main components and working, work done and efficiencies, design proportions; design of Francis turbine runner. Kaplan turbine: main

components and working, working proportions. Draft tube: theory and efficiency; specific speed, unit quantities, characteristic curves of hydraulic turbines. Cavitation: causes, effects.

CENTRIFUGAL PUMPS: Introduction, component parts and working of a centrifugal pump, work done by the impeller; heads, losses and efficiencies; minimum starting speed; Priming ;specific speed; limitation of suction lift, net positive suction head(NPSH);Performance and characteristic curves; Cavitation effects ;Multistage centrifugal pumps; troubles and remedies.

UNIT – V

DIMENSIONAL ANALYSIS AND SIMILITUDE: Introduction, dimensions; Dimensional homogeneity; Methods of dimensional analysis- Rayleigh's method; Buckingham – Pi theorem; model analysis; similitude-types of similarities; Dimensionless numbers; Model laws ;Partially submerged objects; types of models; Scale effect.

BOUNDARY LAYER THEORY& DRAG AND LIFT: Boundary layer – concepts, Prandtl's contribution, Characteristics of boundary layer along a thin flat plate, laminar and turbulent Boundary layers, separation of BL. expression for drag and lift; Lift and Drag Coefficients; pressure drag and friction drag; Streamlined and bluff bodies.

TEXT BOOKS :

(1) Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.
(2) A text of Fluid mechanics and hydraulic machines by Dr.R.K.Bansal – Laxmi Publications (P) Ltd., New Delhi.

REFERENCES :

(1) Fluid Mechanics & Fluid Machines by Narayana Pillai, universities press.
(2) Open channel flow by srinivasan, Oxford University Press
(3) Fluid Mechanics And Machenary-Kothandaraman, New Age Pubilishers
(4) Open Channel flow by K.Subramanya.Tata Mc.Grawhill Publishers.
(5) Elements of Open channel flow by Ranga Raju, Tata MC.Graw Hill, Publications.
(6) Fluid mechanics and fluid machines by Rajput, S.Chand & Co.
(7) Open Channel flow by V.T.Chow, Mc.Graw Hill book company
(8) Hydraulic Machines by Banga & Sharma Khanna Publishers.
(9) Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria & Sons.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01403

II Year B.Tech (Civil Engineering) II Semester	**L**	**P**	**C**
	4	**0**	**4**

STRUCTURAL ANALYSIS – I

OBJECTIVE: *To make the students to understand the principles of analysis of structures of static and moving loads by various methods.*

UNIT – I

ENERGY THEOREMS : Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT – II

ANALYSIS OF INDETERMINATE STRUCTURES : Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano's theorem..

UNIT – III

FIXED BEAMS & CONTINUOUS BEAMS : Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT – IV

SLOPE-DEFLECTION: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports- Analysis of single bay, single storey, portal frame including side sway .

UNIT – V

MOMENT DISTRIBUTION METHOD Introduction to moment distribution method-application to continuous beams with and without settlement of supports. Analysis of single storey portal frames – including Sway

TEXT BOOKS :

(1) Analysis of Structures – Vol-I&II by V.N.Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
(2) Structural Analysis by S S Bhavikatti – Vikas Publishing House.
(3) Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

REFERENCES :

(1) Structural analysis – Hibbler – Pearson education
(2) Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
(3) Structural Analysis – D.S.Prakasa rao - Univeristy press.
(4) Introduction To Structural Analysis-Nautial- New Age Pubilishers
(5) Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, NewDelhi.
(6) Structual analysis Vol.I and II by Dr. R.Vaidyanathan and Dr.P Perumal – Laxmi publications.
(7) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01404

II Year B.Tech (Civil Engineering) II Semester

L	P	C
4	0	4

SURVEYING – II

OBJECTIVE: *To ensure that the student develops knowledge in the working of advanced instruments, setting out of curves from the field measurements and basic knowledge on remote sensing*

UNIT-I

TRIGONOMETRIC LEVELLING : Introduction; Determination of the level of the top of an object, When its base is accessible and When its base is not accessible; Determination of the height of the object when the two instrument stations are not in the same vertical plane; Axis signal correction; Difference in elevation by single observation and reciprocal observations.

UNIT-II

TACHEOMETRIC SURVEYING: Definition, Advantages of Tacheometric surveying-Basic systems of tacheometric measurement , Principle of stadia measurements, Determination of constants K and C, Inclined sight with staff vertical; Inclined sight with staff normal to the line of sight, Movable hair method, Tangential method, Subtanse bar, Errors in Tacheometry.

UNIT-III

TRIANGULATION: Principles of triangulation, Uses of triangulation survey; Classification of triangulation; operations of triangulation survey; Signals and towers, Satellite station; Base line & Extension of the base line.

SETTING OUT WORKS: Introduction, Control stations; Horizontal control; Reference grid; Vertical control; Positioning of a structure; offset pegs, Setting out a foundation: reference pillars, batter boards, Setting out with a theodolite; Graded stakes; setting out a sewer; Setting out a culvert.

UNIT-IV

CURVES: Simple curves–Definitions and Notations, designation of a curve, Elements of simple curves, location of tangent points, selection of peg interval, Methods of setting simple curves(based on equipment) – Rankines method,Two theodolite method. Compound curves – Elements of compound curve, setting out compound curve. Reverse curves – Elements of reverse curve, relationship between various elements.

UNIT-V

ELECTRONIC DISTANCE MEASUREMENTS: Introduction, Basic concepts-electromagnetic waves, basic definitions, phase of the wave ,units, types of waves; distance from measurement of transit time, Computing the distance from the phase differences, , EDM instruments, electronic theodolites, total station-models, fundamental measurements, recording, traversing, data retrieval.

REMOTE SENSING: Introduction, Principle of Remote sensing, EM Radiation and the atmosphere, interaction of EM radiation with earth's surface, remote sensing observation platforms, sensors, applications of remote sensing. Geographical Information System: Introduction and principle of Geographical Information System,components of GIS, applications.

TEXT BOOKS:

1. Surveying Vol. 1 & II by Dr. K. R. Arora; Standard Book House;
2. Surveying Vol-I&II by B.C. Punmia ,Laxmi Publications
3. Higher Surveying by Chandra, New age Pubilishers

REFERENCE BOOKS:

1. Surveying Vol. 1and 2 – By S.K. Duggal. Tata Mc. Graw Hill Publishing Co.
2. Surveying and Levelling by Kanetkar T.P., and Kulkarni , Vols. I and II, United Book Corporation, Pune, 1994.
3.Principles of GIS for land resource assessment by P.A. Burrough –Clerendon Press, Oxford.
4. Advanced Surveying by Mahajan, Santhos K. Dhanpat Rai & Sons, Nai Sarak, Delhi, 1987.
5. Remote sensing and Image Interpretation by Lillesand,T.M.,and Kiefer R.W., John Wiley and Sons, Inc, New York,1997
6. Advanced Surveying: Total Station, GIS and remote Sensing by R. Sathikumar, Satheesh Gopi and N. Madhu, Pearson Education, India

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01405

II Year B.Tech (Civil Engineering) II Semester	**L**	**P**	**C**
	0	**3**	**2**

FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

OBJECTIVE: *The object of the course to make the students understand the fluid flow concepts and get familiarity with flow measuring devices.*

SYLLABUS :

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Varification of Bernoulli's equation.
8. Impact of jet on vanes.
9. Study of Hydraulic jump.
10. Performance test on Pelton wheel turbine.
11. Performance test on Francis turbine.
12. Efficiency test on centrifugal pump.

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01406

II Year B.Tech (Civil Engineering) II Semester	**L**	**P**	**C**
	0	**3**	**2**

SURVEYING LAB – II

OBJECTIVE: *To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.*

LIST OF EXERCISES:

1. Study of theodolite in detail – practice for measurement of horizontal and vertical angles.
2. Measurement of horizontal angles by method of repetition and reiteration.
3. Trigonometric Leveling – Heights and distance problem (Two Exercises).
4. Heights and distance using Principles of tachometric surveying (Two Exercises)
5. Curve setting – different methods. (Two Exercises)
6. Setting out works for buildings & pipe lines.
7. Determination of area using total station.
8. Traversing using total station.
9. Contouring using total station.
10. Determination of remote height using total station.
11. Distance, gradient, Diff. height between tow inaccessible points using total stations.

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01501

L	P	C
4	0	4

B.Tech. III - I sem (C.E.)

DESIGN OF STEEL STRUCTURES

OBJECTIVE: *To understand design specifications, loading and design procedures of different steel structures as per BIS specifications.*

UNIT – I
Materials – Making of iron and steel – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads–and combinations loading wind loads on roof trusses, behavior of steel, local buckling. Concept of limit State Design – Different Limit States as per IS 800 -2007 – Design Strengths- deflection limits – serviceability - Bolted connections – Welded connections – Design Strength – Efficiency of joint – Prying action Types of Welded joints - Design of Tension members – Design Strength of members.

UNIT – II
Design of compression members – Buckling class – slenderness ratio / strength design – laced – battened columns –column splice – column base – slab base.

UNIT – III
Design of Beams – Plastic moment – Bending and shear strength laterally / supported beams design – Built up sections – large plates Web buckling Crippling and Deflection of beams, Design of Purlin.

UNIT – IV
Design of eccentric connections with brackets, Beam end connections – Web angle – Un-stiffened and stiffened seated connections (bolted and Welded types) Design of truss joints

UNIT – V
Plate Girder: Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates stiffeners – splicings and connections.
Gantry Girder : Gantry girder impact factors – longitudinal forces, Design of Gantry girders.

Note: The students should prepare the following plates.
Plate 1 Detailing of simple beams
Plate 2 Detailing of Compound beams including curtailment of flange plates.
Plate 3 Detailing of Column including lacing and battens.
Plate 4 Detailing of Column bases – slab base and gusseted base
Plate 5 Detailing of steel roof trusses including particulars at joints.
Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

FINAL EXAMINATION PATTERN:
The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS

1. limit state design of Steel Structures by Subramanyam.N, Oxford University press, New Delhi
2. Limit State Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi.

REFERENCES

1. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad.
2. Structural design in steel by Sarwar Alam Raz, New Age International Publishers, New Delhi
3. Design of Steel Structures by Edwin Gaylord,Charles Gaylord,James Stallmeyer, Tata Mc.Graw-Hill, New Delhi.

Codes/Tables:

IS Codes:

1) IS -800 – 2007
2) IS – 875 – Part III
3) Steel Tables.
4) Railway Design Standards Code.

and **steel tables** to be permitted into the examination hall.

Outcomes :

On completion of course -

1. Apply the IS code of practice for the design of steel structural elements
2. Design compression and tension members using simple and built-up sections
3. Students will be able to explain the behaviour and modes of failure of tension members and different connections.
4. Students will be able to analyze and design tension members, bolted connections, welded connections, compression members and beams.
5. Design welded connections for both axial and eccentric forces

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01502

B.Tech. III - I sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

CONCRETE TECHNOLOGY

OBJECTIVE: *Lot of advances is taking place in the concrete technology as par with development taking place in the engineering. The present day industry needs the knowledge of concrete technology thoroughly. The subject is designed to give the basic knowledge as well as latest developments in concrete technology.*

UNIT I

CEMENTS & ADMIXTURES: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Test`s on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – II

FRESH & HARDENED CONCRETE: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.Water / Cement ratio – Abram's Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compressive & tensile strength - Curing.Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests –

UNIT – III

SPECIAL CONCRETES: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON – Bacterial concrete(self healing concrete)

UNIT – IV

ELASTICITY, CREEP & SHRINKAGE:– Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage. Introduction to Non-destructive testing methods – Rebound Hammer – Ultra Pulse Velocity method – Pullout - Codal provisions for NDT.

UNIT – V

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method

TEXT BOOKS:

1. Properties of Concrete by A.M.Neville – Pearson publication – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004

REFERENCES:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete: Micro structure, Properties and Materials – P.K.Mehta and J.M.Monteiro, Mc-Graw Hill Publishers
3. Design of Concrete Mix by Krishna Raju, CBS pubilishers.

Outcomes:

After completing the course, the student should be able to do the following:

1. The students should be able to check and recommend different constituent of concrete.
2. The students should be able to test strength and quality of plastic and set concrete.
3. The students should have understanding of application admixture and its effect on properties of concrete.
4. The students should be able to design mix of concrete according to availability of ingredients and design needs.
5. The students should be able to test various strength of concrete by destructive and non-destructive testing methods.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01503

B.Tech. III - I sem (C.E.)

L	P	C
4	0	4

ENVIRONMENTAL ENGINEERING

OBJECTIVE: *This subject provides the knowledge of water sources, water treatment, design of distribution system waste water treatment, and safe disposal methods. The topics of characteristics of waste water, sludge digestion are also included.*

UNIT – I

INTRODUCTION: Importance and Necessity of Protected Water Supply systems, Objectives of Protected water supply system, Flow chart of public water supply system, Role of Environmental Engineer.

WATER DEMAND AND QUANTITY STUDIES : Estimation of water demand for a town or city, Types of water demands, Per capita Demand, Factors affecting the Per Capita Demand, Variations in the Demand, Design Period, Factors affecting the Design period, Population Studies, Population Forecasting Studies.

QUALITY AND ANALYSIS OF WATER: Characteristics of water – Physical, Chemical and Biological. Analysis of Water – Physical, Chemical and Biological. Impurities in water, Water borne diseases. Drinking water quality standards.

UNIT - II

WATER TREATMENT: Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants – feeding arrangements. Filtration and Chlorination**:** Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, other disinfection practices- Miscellaneous treatment methods

WATER DISTRIBUTION : Distribution systems – Requirements, Layout of Water distribution systems - Design procedures- Hardy Cross and equivalent pipe methods service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house, waste detection and prevention.

UNIT – III

INTRODUCTION TO SANITATION :systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage – classification of sewerage systems- Estimation of sewage flow and storm water drainage – fluctuations – types of sewers – Hydraulics of sewers and storm drains– design of sewers – materials for sewers- appurtenances in sewerage – cleaning and ventilation of sewers .

WASTE WATER COLLECTION AND CHARACTERSTICS : Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow – characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. – C.O.D. equations.

UNIT IV

WASTE WATER TREATMENT: Layout and general out line of various units in a waste water treatment plant – primary treatment: design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – biological treatment – trickling filters – standard and high rate – Construction and design of Oxidation ponds.

SLUDGE TREATMENT: Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks and Imhoff Tanks, working principles and design – soak pits.

UNIT – V

SOLID WATE MANAGEMENT: Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

AIR POLLUTION: Types of pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

NOISE POLLUTION: Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

TEXT BOOKS:

1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.
2. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi
3. Environmental Engineering by Peavy, TMH Publishers.

REFERENCS :

1. Environmental Science and Engineering by J.G.Henry and G.W.Heinke – Person Education..
2. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
3. Elements of environmental engineering by K.N. Duggal, S. Chand Publishers.

OUTCOMES:

On completion of the course, the students will be able to:

1. Identify the source of water and water demand
2. Apply the water treatment concept and methods
3. Apply water distribution processes and operation and maintenance of water supply
4. Prepare basic process designs of water and wastewater treatment plants collect, reduce, analyze, and evaluate basic water quality data
5. Determine the sewage characteristics and design various sewage treatment plants
6. Carry out municipal water and wastewater treatment system design and operation
7. Apply environmental treatment technologies and design processes

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01504

B.Tech. III - I sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

WATER RESOURCES ENGINEERING-I

OBJECTIVE:

To study the concepts of

i. *Engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.*
ii. *Irrigation Engineering – Water utilization for Crop growth, canals and their designs.*

UNIT – I

INTRODUCTION TO HYDROLOGY: Engineering hydrology and its applications; Hydrologic cycle; precipitation- types and forms, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, presentation and interpretation of rainfall data.

DESCRIPTIVE HYDROLOGY: Evaporation- factors affecting evaporation, measurement of evaporation; Infiltration- factors affecting infiltration, measurement of infiltration, infiltration indices; Run off- Factors affecting run- off, Computation of run-off; Design Flood; Estimation of maximum rate of run-off; separation of base flow.

UNIT – II

HYDROGRAPH ANALYSIS: Hydrograph; Unit Hydrograph- construction and limitations of Unit hydrograph, Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; S-hydrograph.

GROUND WATER: Introduction; Aquifer; Aquiclude; Aquifuge; aquifer parameters-porosity, Specific yield, Specific retention; Divisions of sub–surface water; Water table; Types of aquifers; storage coefficient-coefficient of permeability and transmissibility; well hydraulics- Darcy's law; Steady radial flow to a well –Dupuit's theory for confined and unconfined aquifers; Tube well; Open well; Yield of an open well–Constant level pumping test, Recuperation test.

UNIT – III

IRRIGATION: Introduction; Necessity and Importance of Irrigation; advantages and ill effects of Irrigation; types of Irrigation; methods of application of Irrigation water; quality for Irrigation water. Duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty.

WATER REQUIREMENT OF CROPS: Types of soils, Indian agricultural soils, preparation of land for Irrigation; soil fertility; Soil-water-plant relationship; vertical distribution of soil moisture; soil moisture tension; soil moisture stress; various soil moisture constants; Limiting soil moisture conditions; Depth and frequency of irrigation; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; Kor depth and Kor period; crop seasons and crop rotation; Irrigation efficiencies; Determination of irrigation requirements of crops; Assessment of Irrigation water. Consumptive use of water-factors affecting consumptive use, direct measurement and determination by use of equations (theory only)

UNIT – IV

CHANNELS – SILT THEORIES: Classification; Canal alignment; Inundation canals; Cross–section of an irrigation channel; Balancing depth; Borrow pit; Spoil bank; Land width; Silt theories–Kennedy's theory, Kennedy's method of channel design; Drawbacks in Kennedy's theory; Lacey's regime theory- Lacey's theory applied to channel design; Defects in Lacey's theory; Comparison of Kennedy's and Lacey's theory.

WATER LOGGING AND CANAL LINING: Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – necessity, advantages and disadvantages; Types of lining; Design of lined canal.

UNIT – V

DIVERSION HEAD WORKS: Types of diversion head works; Diversion and Storage head works; weirs and barrages; Layouts of diversion head works; components; Causes and failure of hydraulic structures on pereable foundations; Blighs creep theory; Khoslastheory; Determination of uplift pressure, impervious floors using Blighs and Khoslas theory; Exit gradient.

CANALOUTLETS: Introduction; types of outlet; flexibility, proportionality, setting ,hyper proportional outlet, sub-proportional outlet, sensitivity, efficiency of an outlet, drowning ratio, modular limit; pipe outlet; kennedy's gauge outlet; gibb's module; canal escape.

TEXT BOOKS:

1. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:

1. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, Delhi
2. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
3. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.

Outcomes :

On completion of the course, the students will be able to:

1. To understand the basic types of irrigation, irrigation standards and crop water assessment
2. To study the different aspects of design of hydraulic structures

To provide knowledge on various hydraulic structures such as energy dissipaters, head and cross regulators, canal falls and structures involved in cross drainage works

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01505

B.Tech. III - I sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

STRUCTURAL ANALYSIS – II

OBJECTIVE: *Indeterminate structures are subjected to different loading with different supported conditions; hence it is necessary to study the behaviour of the structures.*

UNIT I

ARCHES : Three hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature- Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – (No analytical question).

UNIT-II

SLOPE-DEFLECTION & MOMENT DISTRIBUTION METHOD:-Analysis of single bay, single storey, portal frame including side sway– Stiffness and carry over factors – Distribution factors – Analysis of single storey portal frames – including Sway - Substitute frame analysis by two cycle method.

UNIT – III

KANI`S METHOD:-

Analysis of continuous beams – including settlement of supports and single bay, single storey portal frames with side sway by Kani's method.

UNI T – IV

FLEXIBILITY & STIFFNESS METHODS:-

Flexibility methods, Introduction, application to continuous beams including support settlements-Introduction to stiffness method and its application application to continuous beams including support settlements.

UNIT – V

PLASTIC ANALYSIS:

Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

TEXT BOOKS:

1. Analysis of structures by Vazrani & Ratwani – Khanna Publications.
2. Theory of structures by Ramamuratam, jain book depot , New Delhi.

REFERENCES :

1. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.
2. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.

3. Basic Structural Analysis by K.U.Muthu *et al.,* I.K.International Publishing House Pvt.Ltd

Outcomes:

On completion of the course, the students will be able to:

1. Apply the methods of indeterminate truss analysis
2. Demonstrate the behaviour of arches and their methods of analysis
3. Use various classical methods for analysis of indeterminate structures
4. Determine the effect of support settlements for indeterminate structures
5. Able to analyze the beam and frames for vertical and horizontal loads and draw SFD and BMD.
6. Able to calculate forces in members of truss due to load by stiffness method.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01506

B.Tech. III - I sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

ENGINEERING GEOLOGY

OBJECTIVES: *The objectives of this is to give the basic knowledge of Geology that is required for construction of various Civil Engineering Structures. The syllabus includes the basics of Geology. Geological hazard's and gives a suitable picture on the Geological aspects that are to be considered for the planning and construction of major Civil Engineering projects.*

UNIT – I

INTRODUCTION:

Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS : Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like "Granite"

MINERALOGY :

Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartiz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT – II

PETROLOGY :

Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

STRUCTURAL GEOLOGY :

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults un conformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT – III

GROUND WATER ,EARTH QUAKE &LAND SLIDES:-

Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT –IV

GEOPHYSICAL STUDIES:-

Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

UNIT – V

GEOLOGY OF DAMS ,RESERVOIRS AND TUNNELS :

Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor's Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

1) Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
2) Engineerring Geology by Vasudev Kanthi, Universities press, Hyderabad.

REFERENCES:

1. Engineerring geology by Prabin singh, Katson Pubilcations
2. Engineering geology by Duggal, TMH Publishers.
3. Engineering Geology by Subinoy Gangopadhyay, Oxford University press.
4. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications

Outcomes

1. The students would have the knowledge of principles of engineering geology.
2. The students would have the knowledge of properties of soil, various rocks and minerals
3. The students would be able to judge the suitability of sites for various civil engineering structures.
4. The students would exhibit the ability to use the knowledge of geological strata in the analysis and design the civil engineering structures.
5. The students would have the knowledge for deciding the suitability of water and soil conservation projects.

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Code:15A01507

B.Tech. III - I sem (C.E.)	**L**	**P**	**C**
	0	**4**	**2**

ENGINEERING GEOLOGY LAB.

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Inter pretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

Text Books:-

1. **Elementary Exercises in Geology by CVRK Prasad, Universities press.**

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Code:15A01508

B.Tech. III - I sem (C.E.)	**L**	**P**	**C**
	0	**4**	**2**

CONCRETE TECHONOLOGY LAB

1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.
5. Workability test on concrete by compaction factor, slump and Vee-bee.
6. Young's modulus and compressive strength of concrete.
7. Specific Gravity and Water Absorption of Coarse aggregate.
8. Bulking of Fine aggregate.
9. Non-Destructive testing on concrete (for demonstration)

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Vicat's apparatus
6. Specific gravity bottle.
7. Lechatlier's apparatus.
8. Slump and compaction factor setups
9. Longitudinal compressor meter and 1
10. Rebound hammer, Pulse velocity machine.
11. Relevant IS Codes

Reference books:-

1. Concrete Manual by M.L.Gambhir, Dhanpat Rai&co., Fourth edition.
2. Building construction and materials(Lab Manual) by Gambhir , TMH publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A55501

B.Tech III- I Sem.	**L**	**P**	**C**
	0	**4**	**0**

Advanced Communications Skills Lab
(Compulsory Audit Course)

1. INTRODUCTION

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3. SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

UNIT-I: COMMUNICATIVE COMPETENCY

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary for competitive purpose
4. Spotting errors

UNIT-II: TECHNICAL WRITING

1. Report writing
2. Curriculum vitae
3. E-mail writing
4. Abstract & Synopsis Writing
5. Reviewing (Book/Film)

UNIT-III: PRESENTATIONAL SKILLS

1. Oral presentation
2. Power point presentation
3. Poster presentation
4. Stage dynamics
5. Body Language

UNIT-IV: CORPORATE SKILLS

1. Telephonic skills
2. Net Etiquettes
3. SMART Goal setting
4. Time Management
5. Negotiation Skills

UNIT-V: GETTING READY FOR JOB

1. Group discussions-II
2. Interview skills
3. Answering Strategies
4. Mock Interviews

4. LEARNING OUTCOMES:

- Accomplishment of sound vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Effective Speaking Abilities
- Enhanced job prospects.

5. MINIMUM REQUIREMENT:

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 students in the lab:

- Spacious room with appropriate acoustics.

- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

6. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

1. **K-VAN SOLUTIONS-Advanced communication lab**
2. **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
3. **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
4. **Train2success.com**

7. BOOKS RECOMMENDED:

1. **Objective English for Competitive Exams**, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, O U Press 2009.
3. Books on **TOEFL/GRE/GMAT/CAT/IELTS** by Barron's/DELTA/Cambridge University Press.2012.
4. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.
5. **Practice Psychometric Tests**: How to familiarize yourself with genuine recruitment tests, 2012.
6. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
7. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
8. **English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.**
9. **Word Power Made Handy,** Shalini Verma, S Chand Publications, 2011.
10. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011.

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01601

B.Tech. III - II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

DESIGN OF REINFORCED CONCRETE STRUCTURES

OBJECTIVE: *Structural elements are subjected to different loading to with stand the structures, for external loading we need to design the structures for its safety and serviceability.*

UNIT –I
Concepts of RC. Design –Introduction to Working stress method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS: 456 – 2000.
Beams **:** Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.
UNIT – II
Shear, Torsion and Bond **:** Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing
Limit state design for serviceability for deflection, cracking and codal provision.
UNIT - III
Design of Two-way slabs, one way slab, continuous slab Using I S Coefficients, Cantilever slab /Canopy slab.
UNIT –IV
Short and Long columns –axial loads, uni axial and biaxial bending I S Code provisions.
UNIT – V
Design of Footings - isolated (square, rectangular) and Combined footings.
Design of Stair case – Dog legged and Open well.

NOTE : All the designs to be taught in Limit State Method
Following plates should be prepared by the students.
1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, Two way and continuous slabs

FINAL EXAMINATION PATTERN:
The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS:
1. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

2. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishres, New Delhi

REFERENCES :

4. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad
5. Analysis of skeletal structures by seetharamulu kaveti, TMH pubilications.
6. Limit state designed of reinforced concrete – P.C.Varghese, Printice Hall of India, New Delhi

Codes/Tables: IS 456-2000 and IS-800 code books to be permitted into the examinations Hall.

Outcome:

After completing the course, the student should be able to do the following:

1. Will be able to understand the basic concepts of reinforced concrete analysis and design.
2. Will be able to understand the behavior and various modes of failure of reinforced concrete members.
3. Will be able to analyze and design various reinforced concrete members.
4. Will be able to understand and analyze the effect of various support conditions on design of structures.
5. Will be able to implement the knowledge in using analysis and design softwares.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01602

B.Tech. III - II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

GEOTECHNICAL ENGINEERING – I

OBJECTIVE: *The object of this course is to make the student to understand the behaviour of soil under different loads and different conditions. This is necessary because the safety of any structure depends on soil on which it is going to be constructed.*

UNIT – I
INTRODUCTION: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship – Relative density.
INDEX PROPERTIES OF SOILS: Moisture Content, Specific Gravity, Insitu density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

UNIT –II
PERMEABILITY: Soil water – capillary rise – flow of water through soils – Darcy's law-permeability – Factors affecting – laboratory determination of coefficient of permeability – Permeability of layered systems.
SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

UNIT – III
STRESS DISTRIBUTION IN SOILS: Boussinesq's and Wester gaard's theories for point loads and areas of different shapes – Newmark's influence chart .
COMPACTION: Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment – compaction control.

UNIT – IV
CONSOLIDATION : Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil and under consolidated soil - preconsolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement..

UNIT – V
SHEAR STRENGTH OF SOILS : Importance of shear strength **–** Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio – Liquefaction- shear strength of clays.

TEXT BOOKS:
1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

REFERENCES:

1. Soil Mechanics and Foundation by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. Geotechnical Engineering by Iqbal H.Khan, PHI pubilishers.
3. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi.

OUTCOMES:

On completion of the course, the students will be able to:

1. carry out soil classification
2. solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram
3. estimate the stresses under any system of foundation loads
4. solve practical problems related to consolidation settlement and time rate of settlement

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Code:15A01603

B.Tech. III - II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

TRANSPORTATION ENGINEERING – I

OBJECTIVE: *It deal with different components of Transportation Engineering like highway, Railway & Airport Engineering. Emphasis is a Geometric Design of different elements in Transportation Engineering.*

UNIT I
HIGHWAY DEVELOPMENT AND PLANNING:
Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II
HIGHWAY GEOMETRIC DESIGN:
Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients-Vertical curves.

UNIT – III
TRAFFIC ENGINEERING:
Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation – Highway capacity and level of service concept – factors affecting capacity and level of service - Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams.

TRAFFIC REGULATION AND MANAGEMENT:
Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Specifications - Design of Traffic Signals –Webster Method – Saturation flow – phasing and timing diagrams – Numerical problems.

UNIT – IV
INTERSECTION DESIGN:
Conflicts at Intersections- Channelisation: Objectives –Traffic Islands and Design criteria-Types of At-Grade Intersections – Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT – V
PAVEMENT DESIGN :
Types of pavements – Difference between flexible and rigid pavements – Pavement Components – Sub grade, Sub base, base and wearing course – Functions of pavement

components – Design Factors – Flexible pavement Design methods – G.I method, CBR Method, (as per IRC 37-2002) –Design of Rigid pavements – Critical load positions - Westergaard's stress equations – computing Radius of Relative stiffness and equivalent radius of resisting section – stresses in rigid pavements – Design of Expansion and contraction joints in CC pavements. Design of Dowel bars and Tie bars.

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Traffic Engineering and Transportation planning by L.R.Kadiyali and Lal- Khanna Publications.

REFERENCES:

1. Principles and Practice of Highway Engineering Design – L.R.Kadiyali and Lal-Khanna Publications.
2. Text book of Highway Engineering by R.Srinivasa Kumar, Universities Press, Hyderabad.
3. Highway Engineering – Dr.S.K.Sharma, S.Chand Publishers

Outcomes :

On completion of the course, the students will be able to:

1. carry out surveys involved in planning and highway alignment
2. design cross section elements, sight distance, horizontal and vertical alignment
3. implement traffic studies, traffic regulations and control, and intersection design
4. determine the characteristics of pavement materials
5. design flexible and rigid pavements as per IRC

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B.Tech. III - II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

WATER RESOURCES ENGINEERING-II

OBJECTIVE: *To study various head works canal structures and their design principles the subject also covers the river structures, their classifications, designs, etc.*

UNIT – 1

CANAL REGULATION WORKS: Canal falls: Necessity and location of falls; Types of falls; classification of falls; cistern design; roughening devices; design of sarada type fall. Canal regulators: off-take alignment; head regulators and cross-regulators; design of cross-regulator and distributary head regulator.

CROSS DRAINAGE WORKS: Introduction; types of cross drainage works; selection of suitable type of cross drainage work; classification of aqueducts and siphon aqueducts.

UNIT-II

STREAM GAUGING: Necessity; Selection of gauging sites; methods of DischargeMeasurementArea-Velocity method; Slope-Area method; Tracer method, Electromagnetic induction method,Ultrasonic method; Measurement of depth –Sounding rod, Echo-sounder; Measurement ofvelocity: Floats – Surface floats, Sub–surface float or Double float, Velocity rod; Pitot tube;Current meter- rating of current meter, measurement of velocity; chemical method; Measurementof stage-Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage-dischargecurve.

RIVER ENGINEERING: Classification of rivers; Meandering; Causes of meandering; Basic factors controlling process of meandering; Aggrading type of river; Degrading type of River; River training: objectives, Classification of river training works; Types of River training works : Guide banks, Marginal embankments ,Groynes or spur, levees, bank protection, pitched islands.

UNIT-III

RESERVOIR PLANNING: Introduction; Investigations for reservoir planning; Selection ofsitefor a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curveand demand curve; Calculation of reservoir capacity for a specified yield from the mass inflowcurve; Determination of safe yield from a reservoir of a given capacity; Sediment flow instreams:Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Flood routing;Methodsof flood routing-Graphical Method (Inflow – storage discharge curves method).

DAMS :GENERAL: Introduction; Classification according to use; classification according to material- Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams-advantages and disadvantages; Physical factors governing selection of type of dam ; selection of site for a dam.

UNIT-IV

GRAVITY DAMS: Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure: stability requirements; principal and shear stresses; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam- High and low gravity dams; Design of gravity dams–single step method; Galleries; Stability analysis of non–overflow section of Gravity dam.

EARTH DAMS: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures; Slope protection. Seepage through earth dam – graphical method

UNIT-V

SPILLWAYS: Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons; Spillway crest gates-Types and description only.

WATER POWER ENGINEERING: Development of hydro power in India; Classification of hydel plants: runoff river plants, storage plants and pumped storage plants; low, medium and high head schemes ; Investigation and planning; components of hydel schemes – fore bay, intake structure, surge tanks, penstocks ,power house, turbines-selection of suitable type of turbine, Scroll casing .draft tube and tail race; assessment of available power; definition of gross head ,operating head ,effective head; Flow duration curve; Power duration curve; Load duration curve; Load curve ; primary power and secondary power; installed capacity, dependable capacity; firm power, secondary power; power factor ;load factor, capacity factor ,utilization factor and Diversity factor.

TEXT BOOKS:

4. Irrigation and Water Power Engineering by Dr. B.C.Punmia & Dr. Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi.
5. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Irrigation, Waterpower and Water Resources Engineering by K R Arora; Standard Publication,New Delhi.
3. Water resources engineering by Satyanarayana Murthy. Challa, New Age International Publishers

outcomes:

On completion of the course, the students will be able to:

1. Design various channel systems
2. Design head and cross regulator structures
3. Identify various types of reservoir and their design aspects
4. By the Establishes the understanding of cross drainage works and its design
5. Design different types of dams
6. Design gravity dam and earthen dam
7. Design the canal systems

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Code:15A01605

B.Tech. III - II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

ESTIMATION, COSTING AND VALUATION

OBJECTIVE: *The objective of the course is to make the student to understand about estimation and valuations of different types of structures and their valuation as per standard schedule of rates.*

UNIT – I
INTRODUCTION : General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating. **STANDARDS SPECIFICATIONS :** Standard specifications for different items of building construction

UNIT – II
ESTIMATION OF BUILDINGS : Detailed Estimates of Buildings

UNIT – III
EARTHWORK ESTIMATION : Earthwork for roads and canals.
REINFORCEMENT ESTIMATION : Reinforcement bar bending and bar requirement schedules.

UNIT – IV
CONTRACTS AND TENDERS : Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering.

UNIT – V
RATE ANALYSIS : Working out data for various items of work over head and contigent charges.
VALUATION : Valuation of buildings.

TEXT BOOKS
1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Contracts and estimations by B.S.Patil, Universities.Press, Hyderabad.

REFERENCES :
1. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
2. Engineering construction cost by Peurifoy , TMH Publishers.
3. Standard Schedule of rates and standard data book by public works department.
4. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)

Note : Standards scheduled of rates is permitted in the examination hall.

Outcomes :
On completion of the course, the students will be able to:
1. apply different types of estimates in different situations
2. carry out analysis of rates and bill preparation at different locations
3. demonstrate the concepts of specification writing
4. carry out valuation of assets

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01606a

B.Tech. III - II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

EXPERIMENTAL STRESS ANALYSIS
(OPEN ELECTIVE)

Objective:-
To bring awareness on experimental method of finding the response of the structure to different types of load.

1. **PRINCIPLES OF EXPERIMENTAL APPROACH :-**
   Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods –Simplification of problems.
2. **STRAIN MEASUREMENT USING STRAIN GAUGES :-**
   Definition of strain and its relation of experimental Determinations Properties of Strain-Gauge Systems-Types of Strain Gauges –Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – various types –Gauge factor – Materials of adhesion base..
3. **STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE:-**
   Introduction – the three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge.
   Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.
4. **THEORY OF PHOTOELASTICITY** :-
   Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster's Stress Optic law.
5. **TWO DIMENSIONAL PHOTOELASTICITY :-**
   Introduction – Isochramic Fringe patterns- Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

Reference Books :-

1.Experimental stress analysis by J.W.Dally and W.F.Riley, College House Enterprises
2. Experimental stress analysis by Dr.Sadhu Singh.khanna Publishers
3.Experimental Stress analysis by U.C.Jindal, Pearson Pubilications.
4. Experimental Stress Analysis by L.S.Srinath, MC.Graw Hill Company Publishers.

OUTCOMES:
After completion of the course

1. **The student** will be able to understand different methods of experimental stress analysis
2. **The student** will be able to understand the use of strain gauges for measurement of strain
3. **The student** will be exposed to different Non destructive methods of concrete
4. **The student** will be able to understand the theory of photo elasticity and its applications in analysis of structures

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01606b

B.Tech. III - II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT
(OPEN ELECTIVE)

Objective:-

This course is aimed at exposing the student to the concept of environmental impact assessment and methodologies used for the same. The student will also be imparted the knowledge about the various laws related to EIA and also methods of EIA audit.

UNIT – I

INTRODUCTION:-

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT – II

EIA METHODOLOGIES:-

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT – III

IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:-

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT – IV

ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE :

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

ENVIRONEMNTAL AUDIT :

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of

Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT-V

ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION)

Post Audit activities, The Environmental protection Act, The water preventation Act, The Air (Prevention & Control of pollution Act.), Wild life Act.Case studies and preparation of Environmental Impact assessment statement for various Industries.

TEXT BOOKS:

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

REFERENCES:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari & Sons Publication., New Delhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

Outcomes :-

After completion of this course the student will be able to

1. Understand the concept of Environmental impact
2. Understand the methodologies related to EIA
3. Appreciate various laws related to environmental protection
4. Prepare the environmental impact assessment statement and to evaluate it.

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01606c

B.Tech. III - II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT
(OPEN ELECTIVE)

Objectives:

- To familiarize student with the knowledge of theory and design of Industrial waste water treatment.
- To produce civil engineering graduates who have strong fundamental knowledge about the treatment of effluents from food and chemical industries.

UNIT – I:

Quality requirements of boiler and cooling waters - Quality requirements of process water for Textile - Food processing and Brewery Industries - Special Treatment processes.

UNIT – II:

Basic Theories of Industrial Waste water Management - Volume reduction - Strength reduction - Neutralization - Equalization and proportioning. Joint treatment of industrial wastes and domestic sewage - consequent problems.

UNIT –III:

Industrial wastewater discharges into streams. Lakes and oceans and problems.

UNIT – IV:

Recirculation of Industrial Wastes - Use of Municipal Waste Water in Industries. .

UNIT – V:

Industrial Wastes - Special characteristics & Treatment of Liquid Wastes from the following industries: Textile, Tannery, Paper and Pulp, Distilleries, Dairy, Fertilizer Plant, Sugar Mill, Steel plants, oil Refineries -Pharmaceutical plants - thermal power plants.

TEXT BOOKS:

1. Waste Water Treatment by Rao and Dutta. IBH Publishers
2. Metcalf and Eddy. "Waste water Engineering – Collection, Treatment, Disposal and Reuse", Mc Graw Hill Pub. Co., 1995.
3. Water and Waste Water technology by Mark J. Hammer and Mark J. Hammer (Jr)

Course Outcomes:

- Student will be able to identify and analyse the waste from various sources.
- Student will be able to understand about Industrial processes –Origin of waste water – various treatment methods, code of practices – management.

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Code:15A01607

B.Tech. III - II sem (C.E.)	**L**	**P**	**C**
	0	**4**	**2**

GEOTECHNICAL ENGINEERING LAB

OBJECTIVE: *To obtain the properties of soils by conducting experiments, it is necessary for students to understand the behavior of soil under various loads and conditions.*

LIST OF EXPERIMENTS

1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant and variable head test
5. Compaction test
6. CBR Test
7. Consolidation test
8. Unconfined compression test
9. Tri-axial Compression test
10. Direct shear test.
11. Vane shear test

Any eight experiments may be completed.

LIST OF EQUIPMENT:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and Shrinkage limits
3. Field Density apparatus for
    a) Core cutter method
    b) Sand Replacement method

4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 5.15mm, and 0.075mm.
6. Hydrometer
7. Permeability Apparatus for
    a) Constant Head test
    b) Variable Head test
8. Universal Auto compactor for I.S light and heavy compaction tests.
9. Apparatus for CBR test
10. Sampling tubes and sample extractors.
11. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
12. One dimensional consolation test apparatus with all accessories.
13. Tri-axial cell with provision for accommodating 38 mm dia specimens.
14. Box shear test apparatus
15. Laboratory vane shear apparatus.
16. Hot Air ovens (Range of Temperature 50-150^{0}C
17. Moisture cans – 2 dozens.
18. Electronic balances pf 500 g capacity with 0.01g least count and 5 kg capacity with least count of 1gm

19. Measuring Jars - 1000CC- 6
    - 100CC- 4
20. Mercury - 500 g
21. Rammers - 2
    Crow bars - 2

TEXT BOOKS:

1.Soil Testing Lab Manual by K.V.S. Appa Rao & V.C.C.Rao,University Science Press , Laxmi Publication.
2.Soil Testing for Engineers by S.Mittal and J.P.Shukla, Kahna Publishers, New Delhi.
3. Relevant IS Codes.

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01608

B.Tech. III - II sem (C.E.)	**L**	**P**	**C**
	0	**4**	**2**

ENVIRONMENTAL ENGINEERING LAB

OBJECTIVE: *The laboratory provides knowledge of estimating various parameters like PH, Chlorides, Sulphates, Nitrates in water. For effective water treatment, the determination of optimum dosage of coagulant and chloride demand are also included. The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.*

LIST OF EXPERIMENTS

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coliform test.

NOTE: At least 8 of the above experiments are to be conducted.

LIST OF EQUIPMENT

1) pH meter,
2) Turbidity meter,
3) Conductivity meter,
4) Hot air oven,
5) Muffle furnace,
6) Dissolved Oxygen meter,
7) U – V visible spectrophotometer,
8) Reflux Apparatus,
9) Jar Test Apparatus,
10) BOD incubator.
11) COD Extraction apparatus

TEXT BOOKS:

1. Chemistry for Environmental Engineering by Sawyer and Mc. Carty
2. Standard Methods for Analysis of water and Waste Water – APHA
3. Environmental Engineering Lab Manual by Dr.G.Kotaiah and Dr.N.Kumara Swamy, Charotar Publishers, Anand.

REFERENCE

1. Relevant IS Codes.

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01701

B.Tech. IV - I sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

FINITE ELEMENT ANALYSIS

OBJECTIVE: *To familiarize the student with the latest developments in analysis for Civil Engineering problems.*

UNIT –I

INTRODUCTION: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

PRINCIPLES OF ELASTICITY: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT –II

ONE DIMENSIONAL & TWO DIMENSIONAL ELEMENTS: Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems .Two Dimensional Elements - Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

UNIT –III

GENERATION OF ELEMENT : Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements.

UNIT –IV

ISOPARAMETRIC FORMULATION :

Concepts of, isoparametric elements for 2D analysis –formulation of CST element, 4 – Noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.

AXI-SYMMETRIC ANALYSIS: Basic principles-Formulation of 4-noded iso-parametric axi-symmetric element

UNIT-V

SOLUTION TECHNIQUES: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOK:

1. Finite Element Analysis for Engineering and Technology, Tirupathi R Chandraputla, Universities Press Pvt Ltd, Hyderabad. 2003.
2. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers

REFERENCES:

1. Finite element analysis and procedures in engineering by H.V.Lakshminaryana, 3rd edition, universities press, Hyderabad.
2. 3.. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, New Delhi.
3. Finite element analysis by S.S. Bhavakatti-New age international publishers

outcomes:

On completion of the course, the students will be able to:

1. demonstrate the differential equilibrium equations and their relationship
2. apply numerical methods to FEM
3. demonstrate the displacement models and load vectors
4. compute the stiffness matrix for isoperimetric elements
5. analyze plane stress and plane strain problems

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01702

B.Tech. IV - I sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

BRIDGE ENGINEERING

OBJECTIVE: *It deal with different types of Bridges like deck slab bridge, T – Beam Bridge e.t.c and gives a god knowledge on different components of bridges.*

UNIT - I
INTRODUCTION:
Importance of site investigation in Bridge design. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.
BOX CULVERT : General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.
BRIDGE BEARINGS :
General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.

UNIT - II
DECK SLAB BRIDGE :
Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only.

UNIT - III
BEAM & SLAB BRIDGE (T-BEAM BRIDGE)
General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

UNIT – IV
PLATE GIRDER BRIDGE :
Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.
COMPOSITE BRIDGES :
Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders' including shear connectors

UNIT V
PIERS & ABUTMENTS:
General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design).

TEXT BOOKS :

1. Bridge Engineering by Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi.
2. Design of Bridges by N.Krishnam Raju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.
3. Relevant – IRC & Railway bridge Codes.

REFERENCE :-

1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Design of Bridges Structure by D.J.Victor
3. Design of Steel structures by Ramachandra.
4. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
5. Design of Bridges Structure by T.R.Jagadish & M.A.Jayaram Prentice Hall of India Pvt., Delhi.

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Code:15A01703

B.Tech. IV - I sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

GEOTECHNICAL ENGINEERING – II

Objective: *To use the principles of Soil mechanics to design the foundations, Earth retaining structures and slope stability safely and economically knowledge of the subject is essential.*

UNIT – I

SOIL EXPLORATION: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report.

UNIT – II

EARTH SLOPE STABILITY: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

UNIT – III

EARTH PRESSURE THEORIES: Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Rebhann's and Culmann's graphical method

RETAINING WALLS: Types of retaining walls – stability of retaining walls.

UNIT – IV

SHALLOW FOUNDATIONS: Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff's and Skempton`s Methods

ALLOWABLE BEARING PRESSURE : Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures – Settlement Analysis

UNIT –V

PILE FOUNDATION: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

WELL FOUNDATIONS: Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts.

TEXT BOOKS:

1. Geotechnical Engineering by C.Venkataramaiah, New Age Pubilications.
2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi
3. Soil Mechanics and Foundations by – by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCES:

1. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
2. Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson Engineering
3. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
4. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.

5. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.
6. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

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Code:15A01704

B.Tech. IV - I sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

TRANSPORTATION ENGINEERING - II

OBJECTIVE: *It deal with different components of Transportation Engineering like Railway , Airport Engineering & harbours. Sound knowledge can acquire on components of airports, docks and harbours.*

Unit – I

Railway Engineering:

Introduction – permanent way components – cross section of permanent way – functions and requirements of rails, sleepers and ballast – types of gauges – creep of rails – theories related to creep – coning of wheels – adzing of sleepers – rail fastenings.

Unit – II

Geometric design of railway track

Gradients – grade compensation – cant and negative super elevation – cant deficiency – degree of curves – safe speed on railway track – points and crossings – layout and functioning of left hand turn out and right hand turn outs – station yards – signaling and interlocking.

Unit –III

Airport Engineering

Airport site selection – factors affecting site selection and surveys- runway orientation – wind rose diagram – basic runway length – correction for runway length – terminal area – layout and functions – concepts of terminal building – simple building , linear concept, pier concept and satellite concept – typical layouts .

Unit – IV

Geometric design of runways and taxiways

Aircraft characteristics – influence of characteristics on airport planning and design – geometric design elements of runway – standards and specifications as per - functions of taxiways – taxiway geometric design – geometric elements and standard specifications – runway and taxiway lighting.

Unit – V

Ports and Harbours

Requirements of ports and harbours – types of ports – classification of harbours – docks and types of docks – dry docks, wharves and jetties – breakwaters: layouts of different types of harbours and docks – dredging operations – navigation aids.

Text books:

1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi.
2. Satish Chandra and Agarwal, M.M. (2007) “Railway Engineering” Oxford Higher Education, University Press New Delhi.

3. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros.
4. A Text book of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. – (2001).
5. Railway Track Engineering by J.S.Mundrey

References:

1. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian, Scitech pubilishers.
2. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing House Pvt. Limited, 2009
3. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza, Chartor Publishers pvt ltd.

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Code:15A01705

B.Tech. IV - I sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

Cost Effective Housing Techniques

UNIT-I: a) **Housing Scenario**

Introducing - Status of urban housing - Status of Rural Housing

b) Housing Finance:

Introducing - Existing finance system in India - Government role as facilitator - Status at Rural Housing Finance - Impedimently in housing finance and related issues

a**) Land use and physical planning for housing**

introduction - Planning of urban land - Urban land ceiling and regulation act - Efficiency of building bye lass - Residential Densities

b) Housing the urban poor

Introduction - Living conditions in slums - Approaches and strategies for housing urban poor

UNIT-II: Development and adoption of low cost housing technology

Introduction - Adoption of innovative cost effective construction techniques - Adoption of precast elements in partial prefatroices - Adopting of total prefactcation of mass housing in India- General remarks on pre cast rooting/flooring systems - Economical wall system - Single Brick thick loading bearing wall - 19cm thick load bearing masonery walls - Half brick thick load bearing wall - Flyash grypsym thick for masonry - Stone Block masonery - Adoption of precast R.C. plank and join system for roof/floor in the building

UNIT-III: Alternative building materials for low cost housing

Introduction - Substitute for scarce materials – Ferrocement - Gypsum boards - Timber substitutions - Industrial wastes - Agricultural wastes - Fitire starateru; for ,p,topm of alternative building maintenance

Low cost Infrastructure services:

Introduce - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy

UNIT-IV: Rural Housing:

Introduction traditional practice of rural housing continuous - Mud Housing technology

Mud roofs - Characteristics of mud - Fire treatment for thatch roof - Soil stabilization - Rural Housing programs

UNIT-V: Housing in Disaster prone areas:

Introduction – Earthquake - Damages to houses - Traditional prone areas - Type of Damages and Railways of non-engineered buildings - Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions. Requirement's of structural safety of thin precost roofing units against Earthquake forcesStatus of R& D in earthquake strengthening measures - Floods, cyclone, future safety

TEXT BOOKS

1. Building materials for low –income houses – International council for building research studies and documentation.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Properties of concrete – Neville A.m. Pitman Publishing Limited, London.
4. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963.
5. Low cost Housing – G.C. Mathur.
6. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G.Annamalai.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Code:15A01707

B.Tech. IV - I sem (C.E.)	**L**	**P**	**C**
	0	**4**	**2**

CAD LAB.

CAD:
SOFTWARE:
1. STAAD PRO or Equivalent

EXCERCISIES:
1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. Column Analysis & Design

TEXT BOOK:
1.Computer Aided Design Lab Manual by Dr.M.N.Sesha Prakash And Dr.C.S.Suresh

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Code:15A01708

B.Tech. IV - I sem (C.E.)	**L**	**P**	**C**
	0	**4**	**2**

HIGHWAY MATERIALS LAB

I. ROAD AGGREGATES:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS :

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Length and elongation gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Penskey – Morten's apparatus
11. Relevant IS Codes

TEXT BOOKS:-

1. Lab manual in High way Engineering by Ajay.K.Duggal & Vijay .P.Puri, New Age pubilications,New Delhi

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01801a

B.Tech. IV -II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

ADVANCED STRUCTURAL ENGINEERING
(ELECTIVE-II)

OBJECTIVE: *To make the student more conversant with the design principals of multistoried buildings, roof system, foundation and other important structures.*

1. Design of a flat slab(Interior panel only)
2. Design of concrete bunkers of circular shape – (excluding staging) – Introduction to silos
3. Design of concrete chimney
4. Design of circular and rectangular water tank resting on the ground
5. Design of cantilever and counter forte retaining wall with horizontal back fill

FINAL EXAMINATION PATTERN:

The question paper shall contain 2 questions of either or type covering all the syllabus where each question carries 35 marks out of 35 marks, 20 marks shall be for the design and 15 marks are for the drawing.

TEXT BOOKS :-

1. Structural Design and drawing (RCC and steel) by Krishnam Raju, Universites .Press , New Delhi
3. R.C.C Structures by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi
4. Advanced RCC by Varghese , PHI Publications, New Delhi.
5. Design of RCC structures by M.L.Gambhir P.H.I. Publications, New Delhi.

Reference books :-

1. R.C.C Designs by Sushil kumar , standard publishing house.
2. Fundamentals of RCC by N.C.Sinha and S.K.Roy, S.Chand Publications, New Delhi.

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Code:15A01801b

B.Tech. IV -II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

BUILDING CONSTRUCTION & MANGEMENT
(ELECTIVE-II)

Objective: The objective of the course is to make the student to understand about fundamentals of construction management and techniques to be used to perform and complete the construction works intime by saving time and money.

UNIT - I

FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY :

Definitions and Discussion – Construction Activities – Construction Processes - Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations.

PREPARATORY WORK AND IMPLEMENTATION

Site layout – Infrastructure Development – Construction Methods – Construction Materials – Deployment of Construction Equipment – Prefabrication in Construction – Falsework and Temporary Works.

UNIT - II

EARTHWORK :

Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging.Rock Excavation – Basic Mechanics of Breakage – Blasting Theory – Drillability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting.

UNIT - III

PROJECT MANAGEMENT AND BAR CHARTS AND MILESTONE CHARTS :

Introduction – Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT net work problems.

UNIT - IV

ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK :

Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems – Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure –Hierarchies – Illustrative examples – Problems.

UNIT - V

PERT AND CPM: TIME COMPUTATIONS & NETWORK ANALYSIS

Introduction – Uncertainties : Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution –

Expected time Problems -Earliest expected time – Formulation for T_E - Latest allowable occurrence time – Formulation for T_L - Combined tabular computations for T_E and T_L problems.Introduction - Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems – CPM : process – CPM : Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for T_E and T_L - Start and f inish times of activity – Float – Critical activities and critical path – Illustrative examples Problems.

TEXT BOOKS :

1. Construction project management by Jha ,Pearson pubilications,New Delhi.
2. Construction Technology by Subir K.Sarkar and Subhajit Saraswati – Oxford Higher Education- Univ.Press, Delhi.
3. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi.

REFERENCES:

1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
2. Total Project management, the Indian context- by : P.K.JOY- Mac Millan Publishers India Limited.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01801c

B.Tech. IV -II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

WATER HARVESTING AND CONSERVATION
(ELECTIVE-II)

OBJECTIVE:
The main aim of this course is to discuss various aspects of water resources development and management on watershed basis. The various sections in the course will focus on the technical aspects of watershed management; perspectives on water management; skills of analyzing the complex issues in water management and on specific knowledge on issues of watershed management.

Unit – I
Water Harvesting: Principles of water harvesting-methods of rainwater harvesting-design of rainwater harvesting structures-Purification Techniques for direct use- Harvesting of surface runoff-onsite detention basin - ponds - types - Recycling of harvested water

Unit – II
Water Recovery and Reuse: Perspective on recycle and reuse- factors affecting the development of water reclamation and reuse criteria- elements/components of water reclamation and reuse criteria / guidelines- sewage irrigation- Waste water reclamation-waste water recharge for reuse – Treatment Requirements for Water Reuse-methods

Unit – III
Sustainable Watershed Approach & Watershed Management Practices: Concept of watershed-Introduction to watershed management- Integrated water resources management-natural resources management-agricultural practices-integrated farming-Conjunctive use of water resources-Community participation-Watershed Management Practices in Arid and Semiarid Regions-Case studies-Short term and long term strategic planning.

Unit – IV
Watershed Modeling: Standard modeling approaches and classifications, system concept for watershed modeling, overall description of different hydrologic processes, modeling of rainfall- runoff process, subsurface flows and groundwater flow.

Unit – V
Soil and Water Conservation: Scope of soil and water conservation-Mechanics and types of erosion-their causes-Soil erosion control measures - bank protection-vegetative barriers-contour bund- contour trenches-contour stone walls-contour ditches-terraces-outlets and grassed waterways-Gully control structures - temporary and permanent - design of permanent soil conservation structures-Design of farm ponds and percolation ponds.

Text books and Reference books:

1. Pierce, F.J. and Frye, W. W. (1998): Advances in Soil and Water Conservation, Ann Arbor Press, Michigan.
2. Schwab, G. O., Fangmeier, D. D., Elliot, W. J. and Frevert, R. K. (1993): Soil and Water Conservation Engineering, 4th Ed. John Wiley and Sons Inc., USA
3. Murty, J.V.S. "Watershed Management", New Age Intl., New Delhi 1998.
4. Murthy, J.V.S., Watershed Management in India, Wiley Eastern, New Delhi, 1994 .
5. 5.Dilip Kumar Majumdar, Irrigation water management - Principles and Practice, PHI Pvt.Ltd.NewDelhi-1.
6. Madan Mohan Das&Mimi Das Saikia, Irrigation and water power Engineering,PHI learning pvt. Ltd., NewDelhi-1
7. Chatterjee, S. N., Water Resources Conservation and Management, Atlantic Publishers, 2008

OUTCOMES:

After completion of this course the student will be able to understand various concepts related to

1. Water harvesting methods and principles
2. Water recovery and reuse
3. Sustainable watershed management practices
4. Watershed modeling techniques
5. Methods of soil and water conservation

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01802a

B.Tech. IV -II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

DESIGN AND DRAWING OF IRRIGATION STRUCTURES
(ELECTIVE-III)

Design and drawing of the following irrigation structures.

1. Sloping glacis weir
2. Surplus weir.
3. Tank sluice with tower head
4. Type III Syphon aqueduct.
5. Canal regulator.

Final Examination pattern: Any two questions of the above Five designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

TEXT BOOKS:

1. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wiley eastern Ltd.
2. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard Book House.

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01802b

B.Tech. IV -II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

ADVANCED FOUNDATION ENGINEERING
(ELECTIVE –III)

UNIT - I

SHALLOW FOUNDATIONS-I:

General requirements of foundations. Types of shallow foundations and the factors governing the selection of a type of shallow foundation. Bearing capacity of shallow foundations by Terzaghi's theory and Meyerhof's theory (derivation of expressions and solution to problems based on these theories). Local shear and general shear failure and their identification.

Bearing capacity of isolated footing subjected to eccentric and inclined loads. Bearing capacity of isolated footing resting on stratified soils-Button's theory and Siva Reddy analysis.

UNIT - II

ANALYSIS AND STRUCTURAL DESIGN OF R.C.C. FOOTINGS:

Analysis and structural design of R.C.C. isolated, combined and strap footings.

UNIT - III

DEEPFOUNDATIONS:

Pile foundations-types of pile foundations. Estimation of bearing capacity of pile foundation by dynamic and static formulae. Bearing capacity and settlement analysis of pile groups. Negative skin Friction, Pile load tests. Well foundations – elements of well foundation. Forces acting a on a well foundation. Depth and bearing capacity of well foundation. Design of individual components of well foundation (only forces acting and principles of design). Problems associated with well sinking.

UNIT - IV

SHEET PILE WALLS:

Cantilever sheet piles and anchored bulkheads, Earth Pressure diagram, Determination of depth of embedment in sands and clays-Timbering of Trenches – Earth Pressure Diagrams – Forces in struts.

DESIGN OF UNDER REAMED PILES FOUNDATIONS:

Under reamed piles-principle of functioning of under reamed pile-Analysis and structural design of under reamed pile.

UNIT - V

FOUNDATIONS IN PROBLEMATIC SOILS :

Foundations in black cotton soils- basic foundation problems associated with black cotton soils. Lime column techniques – Principles and execution. Use of Cohesive Non Swelling (CNS) layer below shallow foundations.

TEXT/ REFERENCE BOOKS :

1. Analysis and Design of Foundations and Retaining Structures- Shamsher Prakash, Gopal Ranjan and Swami Saran.
2. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
3.Geotechnical Engg. – C.Venkatramaiah. New age International Pvt . Ltd, (2002).

REFERENCES:-

1. Analysis and Design of Foundations – E.W.Bowles.
2. Foundation engineering by Brije.M.Das, Cengage pubilications,New Delhi.
3. Foundations Design and Construction – Tomlinson.
4. Foundation Design-Teng.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01802c

B.Tech. IV -II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

ARCHITECTURE AND TOWN PLANNING
(ELECTIVE-III)

Objective:- To know the western architecture and Indian architecture and also to gain knowledge on the principles of architectural design and historical background of town planning.

A) ARCHITECTURE:

UNIT-I

History of Architecture:

a) **Western Architecture:** Egyptian, Greek, Roman Architectures; influences-Comparative Analysis Orders.

b) **Indian Architecture:** Vedic age - Indus Valley civilization - Buddhist period; stambas, Slenstas. Roranas, Chaityans, Viharas with one example for each Hindu temples - Evaluation of Dravidian and Indo Aryan Styles - Principle factors. Temple of Aibole, Mahabalipuram, Madurai, Deograph, Bhuvaneshwar, Mount Abu.

c) Indo - Sarsanic Architecture; Mosque - Place- Fort Tomb.

UNIT - II

Architectural Design:

a) **Principle of designing** : Composition of plan Relationship between plan and elevation elements, form, surface Mass, Texture, Color, Tone.

b) **Principle of Compositions:** Unity, contrast, proportion, scale, Bab Rhuthm, character.

Principles of Planning a Residence; Site Orientation prospect, Grouping, circulation, privacy, services and other factors.

UNIT – III

Introduction of Post-classic Architecture and contribution of eminent architects to modern period.

Brief summary of post - classic architecture - Indian and Western Architectural contribution of Edward Lutyens, Le Corbusier), Frank Lloyd Wrigt, Walter Groping, Vender Rohe, Caarihan, Nervi, Oscar Niemyer, Edward Durell stone.

B) TOWN PLANNING:

UNIT – IV

Historical Back Ground:

Town planning in India - town plans of Magad - town plans of ancient Indian towns; Mourya, Pataliputra vijayanagara, Delhi.Town planning in the West-town plans of Acropolis, Rome, Paris, London.

UNIT – V

Components of Planning;

a) Zoning
b) Roads and road Traffic.
a) Housing-Slums, Parks, Play grounds.
b) Public Utility Services.
c) Surveys and maps for planning.
d) Neighbourhood Planning.

Planning New town, planning standards, National and regional Planning, town planning and legislation.

Garden cities and satellite town

REFERENCES:

A) ARCHITECTURE

1. Indian Architecture – Vol:- I and II by Percy Brown, Taraporevala Publications, Bombay.
2. Planning and 'Design of Building -Section of Architecture by Y.S.Sane.
3. Modern Architecture and Design by Nikolans, Pevshar.
4. Modern Ideal Hol11nes for India by R.S.Deshpande.

B) TOWN PLANNING

1. Town and Country .Planning - A.J.Brown and H.M.Sherrard.
2. Town Design .- Federik Gibbard, Architectural press, London.
3. National Building Code of India.
4. Town Planning in India - Town and Country Planning Organisation, New Delhi 1962.
5. Regional Planning - Misra R.P., Mysore University.
6. Urban and Regional Planning; Principles and case studies by K.S.Rama Gouda, Mysore University Publications.
7. Town and Country Planning - P. Abercrombe, Oxford University press.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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Code:15A01803a

B.Tech. IV - II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

REHABILITATION AND RETROFITING OF STRUCTURES
(ELECTIVE –IV)

UNIT – I

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage

UNIT – II

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

UNIT – III

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT.

UNIT – IV

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT – V

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

TEXT BOOKS:

1. Concrete Technology by A.R. Santakumar, Oxford University press
2. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.

REFERENCES

1. Defects and Deterioration in Buildings, EF & N Spon, London
2. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H. Ranso, (1981)
4. Building Failures : Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson, (1991).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01803b

B.Tech. IV -II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

URBAN TRANSPORTATION PLANNING
(ELECTIVE –IV)

UNIT -I

Concept Of Travel Demand; Travel Characteristics - Origin, Destination, Route, Mode, Purpose; Travel Demand As A Function Of Independent Variables; Assumptions In Demand Estimation Relation Between Land Use And Travel; Four Step Process Of Transportation Planning.

UNIT - II

Transportation Planning Process; General Concept Of Trip; Trip Generation; Trip Distribution, Traffic Assignment And Mode Split, Aggregate And Disaggregate Models. Date Collection And Sequential And Sequential Recursive Models. Date Collection And Inverntories; Definition Of Study Area; Zoning Principles; Types And Sources Of Date, Home Interview Surveys; Road Side Interview Surveys; Goods. Taxi, IPT Surveys; Sampling Techniques; Expansion Factors And Accuracy Check; Desire Line Diagram And Use.

UNIT - III

Trip Generation Models; Factors Governing Trip Generation And Attraction; Multiple Linear Regression Models, Category Analysis, Trip Distribution Models Methods Of Trip Distribution; Growth Factor Models Uniform Growth Factor Method; Average Growth Factor Method; Factor Method; Furnes Method; Limitation Of Growth Factor Models Concept Of Gravity Model.

UNIT -IV

Traffic assignment and Mode Split; Purpose of Assignment and General Principles; Assignment Techniques - All - or- nothing. Assignment; Multiple route assignment, Capacity restraint method. Minimum path trees; Diversion Curves. Factors affecting mode split; probit, logit and discriminant Analysis.

UNIT - V

Economic Evaluation of Transportation plans; Costs And Benefits Of Transportation Projects; Vehicle Operating Cost; Timesaving Accident Costs. Methods Of Economic Evaluation - Benefit Cost Ratio Method; Net Present Value Method; Internal Rate Of Return Method.

REFERENCES:

1. L.R.Kadiyalli; Traffic Engineering and Transporation Planning Khanna Publishers, Delhi.
2. Papa Costas C.S.; Fundamentals of Transportation Engineering, Prentice Hall, India.
3. Khistry C.J.Transportation Engineering -An Introduction Prentic Hall.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01803c

B.Tech. IV -II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

REMOTE SENSING AND GIS
(ELECTIVE –IV)

UNIT – I
INTRODUCTION TO PHOTOGRAMMETRY:
Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II
REMOTE SENSING :
Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III
GEOGRAPHIC INFORMATION SYSTEM:
Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.
TYPES OF DATA REPRESENTATION:
Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT – IV
GIS SPATIAL ANALYSIS:
Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V
WATER RESOURCES APPLICATIONS:
Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics.
Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

1 Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi.
2 Advanced surveying : Total station GIS and remote sensing – Satheesh Gopi – Pearson publication.

REFERENCES:

1. Fundamentals of remote sensing by gorge Joseph , Universities press, Hyderabad.
2. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4. Remote sensing and GIS by M.Anji reddy ,B.S.Pubiliications,New Delhi.
5. Remote Sensing and its applications by LRA Narayana University Press 1999.
6. GIS by Kang – tsung chang, TMH Publications & Co.,
7. Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell, Oxford Publishers 2004

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01804a

B.Tech. IV -II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

AIR POLLUTION AND CONTROL
(ELECTIVE –V)

UNIT – I

INTRODUCTION : Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

EFFECTS OF AIR POLLUTION : Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT-II

THERMODYNAMIC OF AIR POLLUTION:

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like Sox, Nox, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion.

PLUME BEHAVIOUR : Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

UNIT-III

POLLUTANT DISPERSION MODELS : Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

CONTROL OF PARTICULATES : Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control, Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV

CONTROL OF GASEOUS POLLUTANTS : General Methods of Control of Nox and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

UNIT – V

AIR QUALITY MANAGEMENT : Air Quality Management – Monitoring of SPM, SO; NO and CO Emission Standards.

TEXT BOOKS:

1. Air Quality by Thod godish, Levis Publishers, Special India Edition, New Delhi
2. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
3. Air pollution by Wark and Warner.- Harper & Row, New York.

REFERENCE:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.
2. Air Pollution and Control by K.V.S.G.Murali Krishna, Kousal & Co. Publications, New Delhi.
3. Enivronmental meteorology by S.Padmanabham murthy , I.K.Internationals Pvt Ltd,New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01804b

B.Tech. IV -II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

PRESTRESSED CONCRETE
(ELECTIVE –V)

UNIT – I

INTRODUCTION:

Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

METHODS OF PRESTRESSING:-

Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT – II

LOSSES OF PRESTRESS:-

Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of stress in steel, slip in anchorage ,bending of member and wobble frictional losses.

UNIT – III

ANALYSIS & DESIGN OF SECTIONS FOR FLEXURE;-

Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

UNIT – IV

DESIGN OF SECTION FOR SHEAR :

Shear and Principal Stresses – Design for Shear in beams.

COMPOSITE SECTION:

Introduction – Analysis of stress – Differential shrinkage – General designs considerations.

UNIT – V

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS:

Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long term deflections.

TEXT BOOKS:

1. Prestressed Concrete by N. Krishna Raju; - Tata Mc.Graw HillPublications.
2. Prestressed Concrete by Ramamrutham,Dhanpatrai Publications
3. Prestressed Concrete design Praveen Nagrajan, Pearson publications, 2013 editions.

REFERENCES:

1. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.
2. Pre stressed concrete by E.G.Nawy

Codes/Tables:

Codes: BIS code on prestressed concrete, IS 1343 to be permitted into the examination Hall.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Code:15A01804c

B.Tech. IV - II sem (C.E.)	**L**	**P**	**C**
	4	**0**	**4**

EARTHQUAKE RESISTANT STRUCTURES
(ELECTIVE – V)

UNIT – I

Introduction to Structural Dynamics : – Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

UNIT – II

Multi-Degree of Freedom (MDOF) Systems : - Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

UNIT – III

Earthquake Analysis : - Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi-storyed buildings – Use of response spectra.Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

UNIT – IV

Earthquake Engineering : - Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelegrams.Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column and joints

UNIT – V

Aseismic Planning : - Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings.

Shear walls : - Types – Design of Shear walls as per IS:13920 – Detailing of reinforcements.

TEXT BOOKS:

1. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi.
2. Dynamics of Structures – Clough & Penzien, McGraw Hill – International Edition.
3. Earthquake Resistant Design of Structures by S.K.Duggal, Oxford University press, New Delhi

REFERENCES:

1. Structural Dynamics by Mario Paaz , Academic Pubilishers.
2. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Printice Hall of India, New Delhi
3. Earthquake Tips by C.V.R.Murty, I.I.T. Kanpur.

4. Earthquake Hazardous Mitijation by R.Ayothiraman and Hemanth Hazarika, I.K.International Publishing House Pvt.Ltd., New Delhi.

Codes/Tables:
IS Codes: IS:1893, IS:4326 and IS:13920 to be permitted into the examinations Hall.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (Civil Engineering) 2017-18
COURSE STRUCTURE

I YEAR I Semester

Code	Subject	L	T	P	C
17A15501	**English**	3	-	-	3
17A15101	**Mathematics -I**	2	2	-	3
17A15301	**Engineering Chemistry**	3	-	-	3
17A10101	**Environmental Studies**	3	-	-	3
17A10102	**Engineering Mechanics**	2	2	-	3
17A10501	**Problem Solving and Computer Programming**	2	2	-	3
17A15303	**Engineering Chemistry Lab**	-	1	3	2
17A13501	**Engineering Workshop & IT Workshop**	-	1	3	2
17A15502	**English Language Communication Skills Lab.**	-	1	3	2
17A11301	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**15**	**9**	**9**	**25**

I YEAR II Semester

Code	Subject	L	T	P	C
17A25501	**Technical Communication and Presentat Skills**	3	-	-	3
17A25101	**Mathematics -II**	2	2	-	3
17A25201	**Engineering Physics**	3	-	-	3
17A20303	**Engineering Drawing**	1	1	3	3
17A22301	Electrical & Mechanical Technology	2	2	-	3
17A20101	Strength of Materials- I	2	2	-	3
17A20504	**Computer Programming Lab**	-	1	3	2
17A25202	**Engineering Physics Lab**	-	1	3	2
17A20102	Strength of Materials Lab	-	1	3	2
17A29901	**Community Service (Audit)**	-	-	2	-
17A20102	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**13**	**10**	**14**	**25**

II YEAR I SEMESTER

Code	Subject	L	T	P	C
17A35101	**Mathematical Methods**	2	2	-	3
17A30101	Strength of Materials- II	3	2	-	4
17A30102	Surveying – I	3	-	-	3
17A30103	Fluid Mechanics	3	2	-	4
17A30104	Building Materials and Construction	3	-	-	3
17A39901	**Human Values & Professional Ethics(Aud**	2	-	-	-
17A30105	Surveying lab – I	-	1	3	2
17A35104	**Exploratory Data Analysis Lab**	-	1	3	2
17A30110	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**16**	**9**	**9**	**22**

II YEAR II SEMESTER

Code	Subject	L	T	P	C
17A45401	**Managerial Economics and Financial Analysis**	3	-	-	3
17A45101	**Probability and Statistics**	2	2	-	3
17A40101	Hydraulics & Hydraulic Machinery	2	2	-	3
17A40102	Structural Analysis - I	2	2	-	3
17A40103	Surveying – II	3	-	-	3
17A40104	Fluid Mechanics & Hydraulic Machinery La	-	1	3	2
17A40105	Surveying Lab – II	-	1	3	2
17A40106	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**12**	**9**	**9**	**20**

III YEAR I SEMESTER

Code	Subject	L	T	P	C
17A50101	Design of Steel Structures	3	2	-	4
17A50102	Concrete Technology	3	-	-	3
17A50103	Water Resources Engineering-I	3	-	-	3
17A50104	Structural Analysis – II	2	2	-	3
17A50105	Engineering Geology	3	-	-	3
17A50106	Building Planning & Drawing	1	2	-	2
17A59901	**Foreign Language (Audit)**	2	-	-	-
17A50107	Engineering Geology Lab	-	1	3	2
17A50108	Concrete Technology Lab	-	1	3	2
17A50109	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**16**	**7**	**9**	**23**

III YEAR II SEMESTER

Code	Subject	L	T	P	C
17A60101	Water Resources Engineering-II	3	-	-	3
17A60102	Design of Reinforced Concrete Structures	3	2	-	4
17A60103	Geo Technical Engineering – I	2	2	-	3
17A60104	Estimation, Costing & Valuation	2	2	-	3
17A60105	**Open Elective-I** 1.Environmental Engineering 2.Intellectual Property Rights 3. Industrial Waste and Waste Water Management	3	-	-	3
17A65501	**Advanced Communication Skills Lab**	-	1	3	2
17A60106	Environmental Engineering Lab	-	1	3	2
17A60107	Geo Technical Engineering Lab	-	1	3	2
17A60108	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**13**	**9**	**9**	**23**

Note-

The students shall carry out a mini project for 2 credits related to any area specified under Neeru – Pragathi Program as per the orders of Government of Andhra Pradesh, between the gap of III-II and IV- I semesters. The project shall be evaluated in IV-I by Head of the Department and two senior professors.

IV YEAR I SEMESTER

Code	Subject	L	T	P	C
17A70101	Finite Element Analysis	2	2	-	3
17A70102	Geo – Technical Engineering – II	2	2	-	3
17A70103	Transportation Engineering - I	3	-	-	3
17A70104	**Open Elective*-II** 1.Experimental Stress Analysis 2.Environmental Impact Assessment 3.Disaster Mitigation & Management	3	-	-	3
17A70105	**Elective – I** 1.Bridge Engineering 2.Ground Improvement Techniques 3.Cost Effective Housing Techniques	3	-	-	3
17A79901	**MOOC-I (Audit)****	-	-	-	-
17A70106	Design Studio Lab	-	1	3	2
17A70107	Highway Materials Lab	-	1	3	2
17A70108	**Comprehensive Objective type Examination**	-	-	-	1
17A70109	**Neeru – Pragathi Mini Project**	-	-	-	2
	Total	**13**	**7**	**9**	**22**

Note: Project Work shall be initiated in IV-I Semester with a target of submission of Abstract and finalization of topic, and the evaluation of project work shall be done in IV-II Semester.

*** The student should select the subject in the open elective which is not studied in previous semesters.**

**** The student can select the subject of any discipline for MOOC-I. The Students can register from NPTEL/GIAN/TEQIP. The registration can be done any time from second year onwards.**

IV YEAR II SEMESTER

Code	Subject	L	T	P	C
17A80101	**Elective – II** 1. Advanced Structural Engineering 2.Building Construction Management 3.Water Harvesting and Conservation	3	-	-	3
17A80102	**Elective – III** 1.Design & Drawing of Irrigation Structures 2.Advanced Foundation Engineering 3.Architecture and Town planning	3	-	-	3
17A80103	**Elective – IV** 1.Rehabilitation & Retrofitting of structur 2. Transportation Engineering - II 3.Remote Sensing & GIS	3	-	-	3
17A80104	**Elective – V** 1.Air Pollution & Control 2.Prestressed Concrete 3.Earth Quake Resistant Structures	3	-	-	3
17A89901	**MOOC-II(Audit)*****	-	-	-	-
17A80105	**Seminar**	-	-	4	2
17A80106	**Project Work**	-	-	16	10
17A80107	**Comprehensive Objective type Examination**	-	-	-	1
	Total	**11**	**02**	**20**	**25**

***** The student should select the subject of discipline centric for MOOC-II. The Students can register from NPTEL/GIAN/TEQIP. The registration can be done any time from second year onwards.**

Note: All End Examinations (Theory and Practical) are of three hours duration.

L – Lectures T- Tutorial P – Practical/Drawing C – Credits

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTHAPURAMU
****** DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES ******
I B.TECH – I SEMESTER(R-17)
ENGLISH
(w.e.f Academic Year 2017-18)

Subject Code	Title of the Subject	L	T	P	C
17A15501	English	3	0	0	3

COURSE OBJECTIVES	
1	To enable the students to communicate in English for academic and social purpose
2	To enable the students to acquire structures and written expressions required for their profession.
3	To develop and practice critical and evaluative reading
4	To encourage investigating questions of the humanities through rhetorical study
5	To enhance the study skills of the students with emphasis on LSRW skills

COURSE OUTCOMES	
CO1	Develop facility in responding to a variety of situations and contexts calling for purposeful shifts in voice, tone, level of formality, design, medium, and/or structure
CO2	Become effective in the use of different modes of written communication in a professional environment
CO3	Develop capacity to apply different reading methods to evaluate a mass of data on the net and to glean the necessary information
CO4	Learn and use key rhetorical concepts through analyzing and composing a variety of texts
CO5	Well trained in LSRW skills and develop communicative competence

SYLLABUS

UNIT –I

Chapter entitled *Humour* from "Using English"
Chapter entitled "Jagadish Chandra Bose" from New Horizons

L- Listening -Techniques - Importance of phonetics
L- Meet & Greet and Leave taking, Introducing Oneself and Others (Formal and Informal situations)
R- -Reading Strategies -Skimming and Scanning
W- Writing strategies- sentence structures
G-Parts of Speech –Noun-number, pronoun-personal pronoun, verb- analysis
V-Affixes-prefix and suffix, root words, derivatives

UNIT –II

Chapter entitled *Inspiration* from "Using English"
Chapter entitled "Dhyan Chand" from New Horizons

L- Listening to details
S- Apologizing, Interrupting, Requesting and Making polite conversations
R-note making strategies
W- Paragraph-types- topic sentences, unity, coherence, length , linking devices
G-Auxiliary verbs and question tags
V- synonyms-antonyms, homonyms , homophones, homographs, words often confused

UNIT –III

Chapter entitled *Sustainable Development* from "Using English"
Chapter entitled "After Twenty Years" from New Horizons

L- Listening to themes and note taking
S- Giving instructions and Directions, making suggestions, Accepting ideas, fixing a time and Advising
R- Reading for details -1
W- Resume and cover letter
G- Tenses – Present tense, Past tense and Future tense
V-Word formation and One-Word Substitutes

UNIT –IV

Chapter entitled *Relationships* from "Using English"
Chapter entitled "The Tiger in the Tunnel" from New Horizons

L- Listening to news
S- Narrating stories, Expressing ideas and opinions and telephone skills
R- Reading for specific details and Information
W- Technical Report writing-strategies, formats-types-technical report writing
G- Voice and Subject – Verb Agreement
V- Idioms and prepositional Phrases

UNIT –V

Chapter entitled Science and Humanism from "Using English"
Chapter entitled a. "Daffodils" b. "Where the mind is Without Fear" from New Horizons
L- Listening to speeches
S- Making Presentations and Group Discussions
R- Reading for Information
W- E-mail drafting
G- Conditional clauses and conjunctions
V- Collocations and Technical Vocabulary and using words appropriately
Text Books:

1. **Using English (for detailed study)** published by Orient Black Swan, 2013
2. **New Horizons (for non detailes study) published by Pearson, 2013**

References:

1. **Raymond Murphy's English Grammar with CD,** Murphy, Cambridge University Press, 2012.
2. **Every Day Dialogues in English- Robert J.Dixson, Prentice Hall of India**
3. **Communication Skills, Sanjay Kumar & Pushpalatha** Oxford University Press,

2012.
4. **A Course in Communication Skills**- Kiranmai Dutt & co. Foundation Books, 2012.
5. **Current English grammar and usage-**S M Guptha, PHI, 2013.
6. **A Course in Listening and Speaking-Sasi Kumar.U, U.K.Cambridge**
7. **Powerful Vocabulary Builder**- Anjana Agarwal New Age International Publishers, 2011.
8. **Writing with a Purpose, Tickoo and Sasi Kumar, OUP, 2011**
9. **Oxford Advanced Learners Dictionary, 9th edition, Oxford, 2016**

Method of Evaluation:

The distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation. Each Internal examination shall consist of an objective test for 10 marks and a subjective test for 20 marks with duration of 20 and 90 minutes respectively. In addition to that 10 marks will be awarded for assignment.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTHAPURAMU
****** DEPARTMENT OF CIVIL ENGINEERING******
I B.TECH – I SEMESTER
(Common to all Branches)

Subject Code	Title of the Subject	L	T	P	C
17A15101	**MATHEMATICS – I**	**2**	**2**	**0**	**3**

COURSE DESCRIPTION: First order differential equation, higher order linear differential equations; functions of several variables; applications of integration; multiple integrals, vector calculus.

COURSE OBJECTIVES:

CEO 1: To impart knowledge on the advanced concepts of linear differential equations, functions of several variables, applications of derivatives, multiple integrals and vectors calculus.

CEO 2: To develop skills in analyzing the problems, designing mathematical models, skills in differentiation, integration, and vectors calculus for the problems in engineering.

COURSE OUT COMES: After completion of the course a successful student is able to

CO 1: Acquire knowledge in
- (a) Higher order Differential equations
- (b) Maximum and minimum values for the functions of several variables
- (c) Double and triple integrals
- (d) Differentiation and integration of vector functions.
- (e) Line and surface volume
- (f) Transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO 2: Develop skills in analyzing the
- (a) methods for differential equation for obtaining appropriate solutions,
- (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
- (c) The variations in the properties of functions near their stationary values
- (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO 3: Develop skills in designing mathematical models for
- (a) R-C and L-R-C oscillatory electrical circuits
- (b) Mechanical oscillations.
- (c) Deflection of Beams.
- (d) Heat transfer and Newton's laws of cooling
- (e) Engineering concepts involving lengths of curves and areas of planes Flux across surfaces

CO 4: Develop analytical skills in solving the problems involving
- (a) Newton's laws of cooling
- (b) non homogeneous linear differential equations
- (c) maximum and minimum values for the functions

(d) lengths of curves, areas of surfaces and volumes of solids in engineering
(e) transformations of integrals from three dimensional surfaces and volumes on to plane surfaces

CO 5: Use relevant mathematical techniques for evaluating
(a) various types of particular integrals in differential equations
(b) stationary values for multi variable functions
(c) multiple integrals in change of variables
(d) Integrations of vector functions.

UNIT-I:

FIRST ORDER DIFFERENTIAL EQUATIONS(6 periods)

Linear and Bernoulli type, exact equations and reducible to exact. Orthogonal trajectories (Both Cartesian and polar forms). Newton's law of cooling.

UNIT II:

HIGHER ORDER LINEAR DIFFERENTIALEQUATIONS(12 periods)

Method for solution of linear equations- Differential operator *D*, Solution of second order linear homogeneous equations with constant coefficients, Solution of Higher order homogeneous linear equations with constant coefficients, Solution of Non homogeneous linear equations-Operator methods for finding particular integrals- for cases – e^{ax}, sinax, cos ax, x^n, $e^{ax}V(x)$, $xV(x)$. Method of Variation of parameters. Applications of linear differential equations- Mechanical and Electrical oscillatory circuits and Deflection of Beams.

UNIT – III

Power Series Expansions &Multi-variable Calculus (8 Lectures)

Taylor series, Maclaurin series. Functions of several variables, Continuity, Partial derivatives, Total derivative, Increment theorem, Chain rule, Tangent plane and Normal line, Mixed derivative theorem, Necessary and sufficient conditions for Maxima, Minima and Saddle point, The method of Lagrange multipliers.

UNIT – IV

Multiple Integrals (6 Lectures)

Double integral, Fubini's theorem, Volumes and Areas, Change of variable in a double integral, special case: Polar coordinates, Triple integral, Applications, Change of variables in a triple integral, Surface area, Line integrals, Surface integrals.

UNIT – V

Vector Calculus (12 Lectures)

Vector functions, Continuity and Differentiability of vector functions, Arc length for space curves, Unit tangent vector, Unit normal and Curvature to plane and space curves, Gradient, Directional derivatives, Vector fields, Divergence and Curl of a vector field, vector integrations, Green's Theorem (without Proof), Stokes' Theorem(without Proof), The divergence theorem(without Proof), verifications and applications.

TEXT BOOKS:

1. Engineering Mathematics-I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher
2. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.

REFERENCES:

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publication.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.
5. Advanced Engineering Mathematics 3rd Edition, by R.K.Jain & S.R.K.Iyengar, Narosa publishers.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTHAPURAMU
DEPARTMENT OF CIVIL ENGINEERING
I B.TECH – I SEMESTER (common to CE & ME)

Subject Code	Title of the Subject	L	T	P	C
17A15301	Engineering Chemistry	3	-	-	3

COURSE OBJECTIVES	
1	The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
2	The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
3	The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
4	The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example

COURSE OUTCOMES	
CO1	After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, engineering materials and water chemistry.
CO2	Understand industrially based polymers, various engineering materials.
CO3	Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. The Students select and apply suitable treatments domestically and industrially.

SYLLABUS

UNIT 1 :ELECTROCHEMISTRY

i) Review of electrochemical cells, Numerical calculations.

Batteries: Rechargeable batteries: Lead acid, Ni-Cd, Lithium Ion Batteries, Super capacitors Fuels cells: Fuel cell working principle, classification of fuel cells-Hydrogen-Oxygen and Methanol-Oxygen.

ii) Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples: analysis of Glucose and urea

iii)Corrosion: definition, Types of Corrosion: Dry Corrosion (Direct Chemical attack), Wet Corrosion, Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention:

Anodic and cathodic protection and electro and electroless plating. (10h)

UNIT 2 : POLYMERS

i) Introduction to polymers, Polymerisation process, mechanism:cationic, anionic, free radical

and coordination covalent.

Elastomers Natural Rubber, process of natural rubber, vulcanization, Compounding of Rubber

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, Buna-N, Polyurethene, Polysulfide (Thiokol) rubbers

Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications , PVC, Bakelite, nylons. Polydispersive index

ii) Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.

iii) Liquid Crystals: Introduction, classification and applications

iii) Inorganic Polymers: Basic Introduction, Silicones, Polyphospazins (-(R)2-P=N-) applications. (12h)

UNIT 3 : FUEL TECHNOLOGY

i) Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.

Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Beehive oven and Otto Hoffmann's by product oven processes.

ii) Liquid Fuels:

Petroleum: Refining of Petroleum, Gasoline: Octane and cetane number, Synthetic Petrol: Bergius Processes and Fischer Troph's synthesis

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

iii) Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus. Combustion: reaction of combustion and related problems. (12h)

UNIT. 4 : CHEMISTRY OF ENGINEERING MATERIALS

i) Ceramic: General properties, classification of ceramics

ii) Glass: Manufacture of glass, properties of glass, fracture of glasses, types of glasses.

iii) Cement: Composition, Setting and Hardening (Hydration and Hydrolysis)

iv) Refractories: Classification, properties of refractories and its failures. Applications of refractories.

v) Lubricants: Theory of lubrication, properties of lubricants and applications

vi) Rocket Propellants: Classification, Characteristics of good propellant. (9h)

UNIT.5 WATER TREATMENT

Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity, acidity and chlorides in water, Water treatment for domestic purpose (Chlorination, Bleaching powder, ionization)

Industrial Use of water for Steam generation, Boilers troubles. Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water:

Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminates treatment.

External Treatment: Ion-Exchange and Permutit processes.

Demineralization of brackish water: Reverse Osmosis and Electro dialysis (12h)

Text Books:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi
2. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapathi Rai Publications, New Delhi

References:

1.A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi

2. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
3. Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi
4. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu
5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANATAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
I Year B.Tech - I Semester

(Common to All Branches)

Subject Code	Title of the Subject	L	T	P	C
17A10101	**ENVIRONMENTAL STUDIES**	3	-	-	3

OBJECTIVE: *To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.*

UNIT – I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: – Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II

ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

SOLID WASTE MANAGEMENT : Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK : Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

TEXT BOOKS :

(1) Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
(2) Environmental Studies by Palaniswamy – Pearson education
(3) Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company

REFERENCES :

(1) Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Pubilications.
(2) Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
(3) Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
(4) Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
(5) A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Pubilishing House
(6) Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANATAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU

I Year B.Tech - I Semester

Subject Code	Title of the Subject	L	T	P	C
17A10102	**ENGINEERING MECHANICS**	2	2	0	3

OBJECTIVE: *This course will serve as a basic course by introducing the concepts of basic mechanics which will help as a foundation to various courses.*

UNIT – I

INTRODUCTION OF ENGINEERING MECHANICS – Basic concepts - System of Forces – Moment of Forces and its Application – Couples and Resultant of Force System – Equilibrium of System of Forces - Degrees of Freedom – Free body diagrams –Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT – II

FRICTION : Types of friction– laws of Friction – Limiting friction- Cone of limiting friction– static and Dynamic Frictions – Motion of bodies – Wedge, Screw jack and differential Screw jack.

UNIT – III

CENTROID AND CENTER OF GRAVITY: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies – Area moment of Inertia - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures.

MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids – Moment of Inertia of composite masses.(Simple problems only)

UNIT – IV

KINEMATICS: Rectilinear and Curvilinear motion – Velocity and Acceleration – Motion of A Rigid Body – Types and their Analysis in Planar Motion.

KINETICS : Analysis as a particle and Analysis as a Rigid Body in Translation – Central Forces of motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies – Work Energy Method – Equation for Translation – Work Energy application to Particle Motion, Connection System – Fixed axis Rotation and Plane Motion.

UNIT – V

ANALYSIS OF PERFECT FRAMES: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

MECHANICAL VIBRATIONS: Definitions, Concepts-Simple Harmonic motion-Free vibrations-Simple Compound and Torsional pendulum- Numerical problems

TEXT BOOKS:

(1) Engineering Mechanics by Dr.R.K.Bansal, Lakshmi Publications.
(2) Engineering Mechanics by Shames & Rao – Pearson Education.
(3) Engineering Mechanics by Bhavakatti, New age pubilishers

REFERENCES:

(1) Engineering Mechanics by Seshigiri Rao, Universities Press, Hyderabad.
(2) Engineering Mechanics – B. Bhattacharyya, Oxford University Publications.
(3) Engineering Mechanics by FedrinandL.Singer – Harper Collings Publishers.

(4) Engineering Mechanics (Statics and Dynamics) by Hibller and Gupta; Pearson Education
(5) Engineering Mechanics by S.Timoshenko, D.H.Young and J.V.Rao, Tata McGraw-Hill Company
(6) Engineering Mechanics by Chandramouli, PHI publications.
(7) Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTHAPURAMU
****** DEPARTMENT OF CIVIL ENGINEERING ******
I B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A10501	**Problem Solving and Computer Programming**	2	2	-	3

COURSE OBJECTIVES	
1	To understand the various steps in Program development.
2	To understand the basic concepts in C Programming Language.
3	To learn how to write modular and readable C Programs
4	To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures.
5	To understand the notations used to analyze the Performance of algorithms.

COURSE OUTCOMES	
CO1	Develop flowcharts, algorithms for given complex problems.
CO2	Analyze basic programming constructs.
CO3	Write C programs for real world problems.
CO4	Implement C programming by using various control structures.
CO5	Appreciate coding standards and best practices for program development.

UNIT - I

Introduction: Programs and Programming, Programming Languages, Compiler, Interpreter, Loader and Linker, Program Execution, Classification of Programming, Structured Programming Concept, Algorithms, Flowcharts, System Developments.

Fundamentals Algorithms: Exchange the Values between two variables, Counting, Summation of set of numbers, Factorial Computation, Generation of the Fibonacci sequence, Reversing the digits of a integer.

Basics Of C: Introduction**,** Developing Programs in C, A Simple C program, Parts of C Program Revisited.

UNIT – II

Structure of C: Structure of a C Program, Concept of a Variable, Data Types in C, Program Statements, Declaration, Tokens, Operators and Expressions, Type conversion in C.

Input and Output: Introduction, Basic Screen and Keyboard I/O in C, Non-Formatted Input and Output, Formatted Input and Output Function.

Control Statements: Introduction, Specifying Test Condition for Selection and Iteration, Writing Test Expression, Conditional Execution and Selection, Iteration and Repetitive Execution. Nested Loops.

UNIT – III

Arrays And Strings: Introduction, One-Dimensional Array, Strings, Multidimensional Arrays, Arrays of Strings.

Function: Introduction, Concept of Functions, Using Functions, Call by Value Mechanism, Working with Functions, Passing Arrays to Functions, Scope and Extent, Inline Function, Recursion.

UNIT - IV

Factoring Methods: Finding Square root of a Number, The Smallest Deviser of an Interger, The GCD of Two Integers, Generating Prime Numbers.

Pointers – Introduction, Understanding Memory, Address Operator, Pointer, Void Pointer, Null Pointer, Use of pointer, Arrays and Pointers, Pointers and string, Pointers and string, Pointers to pointers, Array of pointers, Pointers to Function, Dynamic Memory Allocation.
Introduction to Data Structures, Single Linked List.

UNIT – V

User-Defined Data Types and Variables: Introduction, User-defined Data Types, Structures, Union, Enumeration Types.

Files in C: Introduction, Using Files in C, Working with text Files, Working with Binary Fields, Direct File Input and Output, Files of Records, Random Access to Files of Records.

TEXT BOOKS:

1. Programming in C, PradipDey, Manas Ghosh, Second Edition, OXFORD,
2. How to Solve it by Computer by R.G. Dromey, Pearson.

REFERENCES:

1. Programming in C and Data Structures, Jeri R. Hanly, Elliot B. Koffman, Ashok Kamthane and A.Ananda Rao, Pearson Education.
2. Value Range analysis of C programs by simon, Axel by New Age International Publishers.
3. C Programming with problem solving, J.A. Jones & K. Harrow, dreamtech Press
4. Programming in C – Stephen G. Kochan, III Edition, PearsonEductaion.
5. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition Education / PHI
6. C Programming & Data Structures,E.Balagurusamy,TMH.
7. Complete Reference – C, Herbert Schildt,TMH.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTHAPURAMU
****** DEPARTMENT OF CIVIL ENGINEERING ******
I B.TECH – I SEMESTER(common to ME & CE)

Subject Code	Title of the Lab	L	T	P	C
17A15303	Engineering Chemistry lab	-	1	3	2

COURSE OBJECTIVES	
1	Will learn practical understanding of the redox reaction
2	Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention
3	Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications
4	Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology

COURSE OUTCOMES	
CO1	Would be confident in handling energy storage systems and would be able combat chemical corrosion
CO2	Would have acquired the practical skill to handle the analytical methods with confidence.
CO3	Would feel comfortable to think of design materials with the requisite properties
CO4	Would be in a postion to technically address the water related problems.

LIST OF EXPERIMENTS

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Copper by Iodometry
5. Estimation of Iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Acidity and Alkalinity of Water
7. Determination of pH of various water samples.
8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Conductometric titration of Barium Chloride vs Sodium Sulphate (Precipitation Titration)

13. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
14. Estimation of Chloride ion using potassium Chromite indicator (Mohrs method)

TEXT BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, Pearson
Education.
2. Chemistry Practical – Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera

JNTUA COLLEGE OF ENGINEERING (Autonomous)-ANANTAPURAMU
DEPARTMENT OF CIVIL ENGINEERING
I- Year B.Tech. I-Sem

Subject Code	Title of the Lab	L	T	P	C
17A13501	**ENGINEERING WORKSHOP& IT WORKSHOP LAB**	-	1	3	2

Part-A
ENGINEERING WORKSHOP
(Common to All Branches)

Course objectives:

- The objective of this subject is to provide the basic concepts about the engineering workshop trades like Carpentry, Fitting etc.
- Gain knowledge of the use of various workshop tools and make models in the respective trades.
- Exposure to power tools

Course Outcomes:

- CO1: Student will be aware of the safety aspects in using the tools
- CO2: Student will be able to use the tools for the preparation of models in respective trades of engineering workshop.
- CO3: Precautions in making the models will be known by the student.
- CO4: Student will be aware of the usage of the power tools for various purposes.
- CO5: Knowledge about the measuring instruments will be achieved.

1. TRADES FOR EXERCISES:

At least 2 Exercises in each of the following trades :

1. Carpentry
2. Fitting
3. House-wiring
4. Black Smithy
5. Tin smithy
6. Power Tools Demonstration

TEXT BOOK:

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/ Scitech Publishers.

PART-B
IT workshop Lab

COURSE OBJECTIVES	
1	To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
2	To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
3	To learn about Networking of computers and use Internet facility for Browsing and Searching

COURSE OUTCOMES	
CO1	Disassemble and Assemble a Personal Computer and prepare the computer ready

	to use
CO2	Prepare the Documents using Word processors and Prepare spread sheets for calculations using excel
CO3	Prepare Slide presentations using the presentation tool
CO4	Interconnect two or more computers for information sharing
CO5	Access the Internet and Browse it to obtain the required information

Preparing your Computer

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc.

If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page

setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement.Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

References:

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, Powerpoint& Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTHAPURAMU
****** DEPARTMENT OF CIVIL ENGINEERING ******
I B.TECH – I SEMESTER(R-17)

Subject Code	Title of the Lab	L	T	P	C
17A15502	English Language Communication Skills Lab	-	1	3	2

COURSE OBJECTIVES	
1	To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2	To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
3	To provide opportunities for practice in using English in day to day situations
4	To improve the fluency in spoken English and neutralize mother tongue influence
5	To train students to use language appropriately for debate, group discussion and public speaking

COURSE OUTCOMES	
CO1	Better Understanding of nuances of language through audio- visual experience and be independent learners
CO2	The significance of paralinguistic features will be understood by the students and they will try to be intelligible.
CO3	Become good at Inter-personal skills
CO4	Achieve neutral accent and be free from mother tongue influence
CO5	Being an active participant in debates and group discussion, showing ability to express agreement, argument to summarize ideas to elicit the views of others and present own ideas;

UNIT- I
Phonetics – Introduction to Sounds of Speech – Vowels – Consonants – Phonetic Transcription & Orthographic Transcription
UNIT – II
Syllabification – Word Stress – Rules of word stress – Intonation – Falling tone and Rising tone
UNIT – III
Situational Dialogues – Role-play – Expressions in various situations – Self Introduction – Introducing others – Greetings – Apologies – Requests – Giving directions -Social and Professional etiquettes – Telephone Etiquettes
UNIT – IV
JAM – Describing Pictures, Photographs, Products, and Process – Talking about Wishes-Information Transfer.
UNIT – V
Debates - Group Discussions-1

MINIMUM REQUIREMENT FOR ELCS LAB:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab:
   The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with LAN with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor
   a) Speed – 2.8 GHZ
   b) RAM – 512 MB Minimum
   c) Hard Disk – 80 GB

ii) Headphones of High quality

SUGGESTED SOFTWARE:

1. Walden Infotech English Language Communication Skills.
2. Clarity Pronunciation Power – Part I (Sky Pronunciation)
3. Clarity Pronunciation Power – part II
4. LES by British council
5. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
6. *DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.*
7. Lingua TOEFL CBT Insider, by Dreamtech
8. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
9. Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:

1. **A Textbook of English Phonetics for Indian Students** 2nd Ed T. Balasubramanian. (Macmillian), 2012.
2. **A Course in Phonetics and Spoken English**, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
3. **Speaking English Effectively**, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
4. **A Hand book for English Laboratories**, E.Suresh kumar, P.Sreehari, Foundation Books,2011
5. **English Pronunciation in Use. Intermediate & Advanced**, Hancock, M. 2009. CUP
6. **Basics of Communication in English**, Soundararaj, Francis. 2012.. *New Delhi: Macmillan*
7. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.
8. **English Pronouncing Dictionary**, Daniel Jones Current Edition with CD.Cambridge, 17th edition, 2011.

Method of Evaluation:

English Language Laboratory Practical Examination:

1. The Practical Examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core Engineering practical sessions.

2. For the Language lab sessions, there shall be a continuous evaluation during the year for 40 sessional marks and 60 year-end Examination marks. Of the 40 marks, 20 marks shall be awarded for day-to-day work and 20 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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****** DEPARTMENT OF CIVIL ENGINEERING ******
I B.TECH – II SEMESTER(R-17)

Subject Code	Title of the Subject	L	T	P	C
17A25501	**Technical Communication and Presentation Skills**	3	0	0	3

COURSE OBJECTIVES	
1	To develop awareness in students of the relevance and importance of technical communication and presentation skills.
2	To prepare the students for placements
3	To sensitize the students to the appropriate use of non-verbal communication
4	To train students to use language appropriately for presentations and interviews
5	To enhance the documentation skills of the students with emphasis on formal and informal writing

COURSE OUTCOMES	
CO1	Become effective technical communicators
CO2	Be job-ready and able to face interviews confidently
CO3	Sensitive use of non-verbal language suitable to different situations in professional life
CO4	Learn and use keys words, phrases and sentence structures making a mark in interviews and presentation skills
CO5	Effective writing skills with the ability to use different styles for different situations

SYLLABUS

UNIT 1:
Basics of Technical Communication – Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication - LSRW Skills – Barriers to effective communication

UNIT II
Informal and Formal Conversation - Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

UNIT III
Written communication – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication- Art of condensation- summarizing and paraphrasing

UNIT IV

Presentation Skills – Nature and importance of oral presentation – Defining the purpose – Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing the presentation –Individual and group presentations - Handling stage fright

UNIT V

Interview Skills – The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

Text Books:

1. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma,3rd Edition, O U Press 2015

References:

1.Communication Skills by Pushpalatha & Sanjay Kumar, Oxford Univsesity Press

2.Books on **TOEFL/GRE/GMAT/CAT/ IELTS** by Barron's/DELTA/Cambridge University Press.2012.

3. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.

4. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.

5. **Successful Presentations** by John Hughes & Andrew Mallett, Oxford.

6. **Winning at Interviews** by Edgar Thorpe and Showick Thorpe, Pearson

7. Winning Resumes and Successful Interviews by Munish Bhargava, Mc Graw Hill

Method of Evaluation:

The distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation. Each Internal examination shall consist of an objective test for 10 marks and a subjective test for 20 marks with duration of 20 and 90 minutes respectively. In addition to that 10 marks will be awarded for assignment.

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I B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A25101	**MATHEMATICS – II**	**2**	**2**	**0**	**3**

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms;partial differential equations.

COURSE OBJECTIVES:

CEO 1: To impart basic knowledge on Fourier series, Fourier transforms, Laplace Transforms, z-transforms and partial differential equations.

CEO 2: To develop skills in analyzing the problems, designing mathematical models,
Fourier series, Fourier transforms, Laplace transforms, z-transforms and partial differential equations for the problems in engineering.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO 1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) Solving partial differential equations
- (f) Heat transfer and wave motion

CO 2: Develop skills in Analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO 3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO 4: Develop analytical skills in solving the problems involving
- (a) Fourier series and Fourier transforms
- (b) Laplace transforms
- (c) Z-transforms and difference equations
- (d) Heat transfer and wave motion

CO 5: Use relevant transformation techniques for
- (a) Obtaining Fourier transforms for different types of functions
- (b) Laplace transforms
- (c) Z- transforms
- (d) Partial differential equations

UNIT- I :

FOURIER SERIES (7 periods)

Fourier series: Determination of Fourier coefficients (Euler's formulae),Fourier series of even and odd functions, convergence of Fourier series (Dirichlet conditions), Half-range Fourier sine and cosine expansions, Parseval's formula, Complex form of Fourier series.

UNIT- II:

FOURIER INTEGRALS AND FOURIER TRANSFORMS(8 periods)

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III:

LAPLACE TRANSFORMS (12 periods)

Laplace transforms of standard functions. Properties of Laplace transform. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem, inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Step and Impulse functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV :

Z- TRANSFORMS (9 periods)

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem, Solution of difference equations by Z– transforms.

UNIT – V :

PARTIAL DIFFERENTIAL EQUATIONS (9 periods)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions ,Method of separation of variables , Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.

REFERENCES:

1. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
2. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
4. Advanced Engineering Mathematics 3rd Edition, by R.K.Jain & S.R.K.Iyengar, Narosa publishers

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****** DEPARTMENT OF CIVIL ENGINEERING ******
I B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A25201	**ENGINEERING PHYSICS**	3	-	-	3

COURSE OBJECTIVES	
1	To make a bridge between the physics in school and engineering courses.
2	To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.
3	To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications.
4	To understand and employ the concepts of waves & oscillations and acoustics to engineering applications.
5	To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications. Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nano and smart materials, their properties and applications in modern emerging technologies are elicited.
6.	To enlighten the characterization of materials by different techniques, the periodic arrangement of atoms in crystals, Bragg's law and X-Ray diffraction technique.

COURSE OUTCOMES	
CO1	The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fiber optics.
CO2	The concepts of types of waves and oscillations ,acoustics are highlighted
CO3	The dielectric and magnetic response of materials are focussed.
CO4	The importance of superconducting materials, nano and smart materials along with their engineering applications are well elucidated.
CO5	Characterization of materials by advanced techniques, the important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction technique are focused.

SYLLABUS

UNIT 1: PHYSICAL OPTICS, LASERS AND FIBRE OPTICS

Physical Optics*:* Introduction to interference – Colours in thin films – Newton's Rings – Michelson interferometer - Fraunhoffer diffraction due to single slit, double slit – Diffraction grating (Qualitative).

Lasers*:* Introduction – Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients — Population inversion – Pumping mechanisms - Nd:YAG laser – He-Ne laser – Applications of lasers.

Fiber optics: Introduction – working principle of optical fiber – Numerical aperture and acceptance angle – V- Number - Types of optical fibers –Optical fiber communication system – Attenuation and losses in optical fibers – Applications of optical fibers.

UNIT 2: **WAVES & OSCILLATIONS AND ACOUSTICS**

Waves & Oscillations*:* Categories of waves: Mechanical, electromagnetic, matter and gravitational – Reflection and transmission of waves at a boundary – Free oscillations – Damped Oscillations – Forced oscillations – Resonance – Coupled oscillations.

Acoustics – Absorption coefficient and its measurement – Reverberation time – Sabine's formula – Acoustic Quieting – Methods of Quieting.

UNIT 3: **DIELECTRICS AND MAGNETIC MATERIALS**

Dielectrics*:* Introduction – Dielectric Polarization – Types of Polarization – Lorentz field – Clausius-Mosotti equation – Piezoelectricity – Ferroelectricity – Dielectric strength, loss and breakdown.

Magnetic materials*:* Introduction – Basic definitions – Origin of magnetic moment – Classification of magnetic materials – Hysteresis – Soft and hard magnetic materials – Applications of magnetic materials.

UNIT 4: **ADVANCED MATERIALS**

Superconductors*:* Introduction – Properties of superconductors – Meissner effect– Type I and Type II superconductors – ac and dc Josephson effects – BCS theory (qualitative treatment) – High T_c superconductors – Applications of superconductors.

Nanomaterials: Introduction – Surface area and quantum confinement – Physical properties: optical, thermal, mechanical and magnetic – Carbon Nanotubes – Applications of nanomaterials.

Smart Materials: Shape Memory Alloys: Definition – Two phases – One way and two way memory effect – Pseudo elasticity – Applications of shape memory alloys.

UNIT 5: CRYSTALLOGRAPHY AND MATERIAL CHARACTERIZATION

Crystallography*:* Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction – Bragg's law.

Material Characterization: Electron microscopy: SEM, TEM, AFM – Non-destructive testing: objectives – Methods: Pulse-echo method.

Prescribed Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S.Chand and Company
2. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press.

Reference Books:

1. Introduction to modern optics – Grant R Fowles
2. A text book on Optics – Brijlal & Subramanyam
3. Laser Fundamentals – William T. Silfvast, Cambridge University Press

4. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
5. Introduction to Nanotechnology – C P Poole and F J Owens, Wiley
6. Shape Memory Alloys-Modeling and Engg. Applications – C Lagoudas, Springer
7. Hand Book of Non-destructive evaluation, C.J.Hellier, McGraw-Hill
8. Engineering Physics – V. Rajendran, K.Thyagarajan Tata MacGraw Hill Publishers
9. Engineering Physics – M.R.Srinivasan, New Age Publications
10. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
11. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
12. Engineering Physics – M. Arumugam, Anuradha Publications

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****** DEPARTMENT OF CIVIL ENGINEERING ******
I B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A20303	Engineering Drawing	1	1	3	3

COURSE OBJECTIVES	
1	To draw and understand the practical importance of geometrical constructions.
2	To understand the representation of the regular planes and solids in first angle of projections

COURSE OUTCOMES	
CO1	Student will be familiar with the BIS conventions and dimensions
CO2	Student will be familiar with the positions of points and straight lines under different cases
CO3	Student will be able to represent regular planes and solids on the drawing sheet for various cases
CO4	Student can draw the development for regular solids
CO5	Student will familiarize with the 2D and 3D projections of various figure

SYLLABUS
(Common to Civil and Chemical Engg.).

Unit-I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance Drawing Instruments and their Use – BIS Conventions in drawing and Lettering.
Curves used in practice:

a) Conic sections including the Rectangular Hyperbola
b) Cycloid, Epicycloid and Hypocycloid –Normals and Tangents
c) Involute of a circle –Normals and Tangents

Principles of orthographic projection, I and III angle projections –Conventions –Projections of points.

Unit –II

Projection of lines inclined to both planes –traces, Projection of plane figures inclined to both planes.

Unit –III

Projection of simple solids inclined to both planes.

Unit –IV

Sections and Developments: Sections and Sectional views of Regular solids –Prism, Cylinder, Pyramid, Cone – True shapes.

Unit –V

Isometric projections: Principles of pictorial representations-Isometric projection- Isometric scale-Isometric views- conventions- Isometric views of plane figures, solids-Isometric projection of objects with non isometric lines-Isometric projection of spherical parts.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai.

REFERENCES:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers.
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal/New age Publishers
4. Engineering Graphics, John&john.

Method of Evaluation:

The distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation.

Internal mid examination for 30 marks and internal assessment for 10 marks shall be awarded for internal evaluation.

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COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTAPURAMU
I B. Tech –II-SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A22301	**ELECTRICAL & MECHANICAL TECHNOLOGY**	2	2	-	3

PART – A
ELECTRICAL TECHNOLOGY

Course Objectives:

To make the students learn about:

1	The basics of AC & DC Circuits, DC generators & motors.
2	The construction and operation of Transformers, Induction motors and their performance aspects will be studied.

Course Outcomes:

After completing the course, the student should be able to :

CO1	Analyze the basics of AC & DC Circuits and know the performance characteristics of DC generators & motors.
CO2	Gets a thorough knowledge on Transformers, Induction motors & Alternators with which he/she can able to apply the above conceptual things to real-world problems and applications.

UNIT – I Introduction to DC & AC Circuits

Ohm's Law, Basic Circuit Components, Kirchhoff's Laws, Types of Sources, Resistive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Principle of AC Voltages, Waveforms and Basic Definitions, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, The J Operator and Phasor Algebra, Analysis of Ac Circuits With Single Basic Network Element, Single Phase Series.

UNIT-II DC Machines

D.C Generators: Principle of Operation of Dc Machines, Types of D.C Generators, E.M.F Equation in D.C Generator, O.C.C. of a D.C. Shunt Generator

D.C Motors: Principle of Operation of Dc Motors, Types of D.C Motors, Torque Equation, Losses and Efficiency Calculation in D.C Motor- Swinburne's Test

UNIT-III AC Machines

Transformers: Principles of Operation, Constructional Details, Losses and Efficiency, Regulation of Transformer, Testing: OC & SC Tests.

Three Phase Induction Motors: Principle of Operation, Slip and Rotor Frequency, Torque (Simple Problems).

Alternators: Principle of Operation-Constructional Details-EMF Equation-Voltage Regulation by Synchronous Impedance Method.

TEXT BOOKS:

1. Basic Electrical Engineering - By M.S.Naidu and S. Kamakshiah – TMH.

2. Basic Electrical Engineering –By T.K.Nagasarkar and M.S. Sukhija Oxford University Press.
3. Electrical and Electronic Technology-By Hughes – Pearson Education.

REFERENCES:

1. Theory and Problems of Basic Electrical Engineering by D.P.Kothari & I.J. Nagrath PHI.
2. Principles of Electrical Engineering by V.K Mehta, S.Chand Publications.
3. Fundamentals of Electrical Electronics Engineering by T.Thyagarajan, SCITECH Publications 5th Edition-2007

PART – B
MECHANICAL TECHNOLOGY

UNIT – I

WELDING PROCESSES: Introduction to welding classification of welding processes, Oxyacetylene welding – equipment, welding fluxes and filler rods, Gas cutting, Introduction to are welding – Manual metal are welding. Submerged are welding, TIG and MIG processes, soldering and brazing Importance, comparison and applications.

UNIT - II

Description and working of steam engines and steam turbines (Prime movers) – impulse and Reaction turbines. Description and working of I.C. Engines – 4 stroke and 2 stroke engines – comparison – Gas Turbines – Closed and open type gas turbines.

Reciprocating Air compressors – description and working of single stage and multistage reciprocating air compressors – inter cooling. Transmission of power; Belt, Rope, Chain and gear drive-simple problems.

UNIT - III

Block diagram of a vapour compression refrigeration system. Names of common refrigerates. Basic principles of air-conditioning. Room and General air conditioning systems Ducting – Different types of ventilation system. Earth moving machinery and Mechanical handling equipment – bull dozers – power showels – Excavators – concrete mixer – Belt and bucket conveyers.

TEXT BOOKS :

1. Mechanical Technology by Khurmi.
2. Mechanical Technology by Kodandaraman C.P.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
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IYear B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A20101	**STRENGTH OF MATERIALS – I**	2	2	--	3

OBJECTIVE: *The subject provide the knowledge of simple stress strains flexural stresses in members, shear stresses and deflection in beams so that the concepts can be applied to the Engineering problems.*

UNIT – I

SIMPLE STRESSES AND STRAINS : – Deformable bodies - Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

Strain energy **–** Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT – II

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

FLEXURAL STRESSES : Theory of simple bending – Assumptions – Derivation of bending equation: M/I =f/y = E/R – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections.

UNIT – IV

DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods.

Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L. uniformly varying load-Mohr's theorems – Moment area method – application to simple cases including overhanging beams-deflections of propped cantilevers for simple loading cases.

UNIT – V

CONJUGATE BEAM METHOD: Introduction – Concept of conjugate beam method. Difference between a real beam and a conjugate beam. Deflections of determinate beams with constant and different moments of inertia.

DIRECT AND BENDING STRESSES : Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and bending moment about both axis.

TEXT BOOKS :

(1) Mechanics of Materials – Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.
(2) Strength of Materials by R.K Rajput, S.Chand & Company Ltd.
(3) Strength of Materials by B.S.Basavarajaiah, Universities Press, Hyderabad.
(4) Strength of materials by Timoshenko , PHI Publications

REFERENCES:

1. Strength of Materials by Ghosh & Datta, New Age Pubilishers
2. Strength of Materials by Dr.R.K.Bansal, Lakshmi Publications.
3. Strength of Materials by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.

Outcome :

(1) The students would be able to understand the behavior of materials under different stress and strain conditions.
(2) The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading.
(3) The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams, and columns under various loading conditions using different analysis methods.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTHAPURAMU
****** DEPARTMENT OF CIVIL ENGINEERING ******
I B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A20504	**Computer Programming Lab**	-	1	3	2

COURSE OBJECTIVES	
1	To work with the compound data types
2	To explore dynamic memory allocation concepts
3	Able to design the flowchart and algorithm for real world problems
4	Able to write C programs for real world problems using simple and compound data types
5	Employee good programming style, standards and practices during program development

COURSE OUTCOMES	
CO1	Translate algorithms in to programs
CO2	Code and debug programs in C program language using various constructs.
CO3	Formulate problems and implement algorithms in C.
CO4	Able to use different data types in a computer program

LIST OF EXPERIMENTS

Week-1
1) Write a C program to make the following exchange between the variables a-> b -> c->d - > a
2) Write a C program to carry out the arithmetic operations addition, subtraction, multiplication, and division between two variables
3) Write a C program for printing prime numbers between 1 and n.

Week-2
1) Write a C program to construct a multiplication table for a given number.
2) Write a program to reverse the digit of a given integer.
3) Write a C program to find the sum of individual digits of a positive integer.
4) Write a C program to calculate the factorial of a given number

Week-3
1) Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

2) Write a program to calculate tax, given the following conditions:

a) If income is less than 1,50,000 then no tax.
b) If taxable income is in the range 1,50,001 – 300,000 then charge 10% tax
c) If taxable income is in the range 3,00,001 – 500,000 then charge 20% tax
d) If taxable income is above 5,00,001 then charge 30% tax

Week-4

1) Write a program to print the calendar for a month given the first Week- day of the month.

Input the first day of the month (Sun=0,Mon=1,Tue=2,Wed=3,.....) :: 3

Total number of days in the month : 31

Expected output

Sun	*Mon*	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*
-	-	-	*1*	*2*	*3*	*4*
5	*6*	*7*	*8*	*9*	*10*	*11*
12	*13*	*14*	*15*	*16*	*17*	*18*
19	*20*	*21*	*22*	*23*	*24*	*25*
25	*26*	*27*	*28*	*29*	*30*	*31*

2) Write a C program to find the roots of a quadratic equation

Week-5

1) Write a program to print the Pascal triangle for a given number
2) Write a C program to find the GCD (greatest common divisor) of two given integers
3) Write a C program to construct a pyramid of numbers.
4) Write C code to define a function cash_dispense, which takes an amount as its input, and returns the number of 1000, 500, 100, 50, 20, 10, 5, 2, 1 rupee denomination that make up the given amount

Week-6

1) Write C code to reverse the contents of the array. For example, [1,2,3,4,5] should become [5,4,3,2,1]
2) Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices

   ii) Multiplication of Two Matrices

3) Write a program that will search and find out the position where the given key element exist in a user chosen array and print it as output.

Week-7

1) Write C code to compute the frequency table of survey responses given by 20 users. The survey responses range from 1 to 5 and are stored in an array. For example, 10 responses are stored in the array [1,1,5,2,3,3,5,5,2,2]. The frequency table will be as shown below:
   a. 1 = 2
   b. 2 = 3
   c. 3 = 2
   d. 4 = 0
   e. 5 = 3
2) Write a program to define a function to sort an array of integers in ascending order by using exchange sort.

Week-8

1) Write a C program to check whether a given string is a palindrome or not, without using any built-in functions.

2) Write a C program to determine if the given string is a palindrome or not by using string functions.
3) Write a function that accepts a string and delete the first character.
4) Write a function that accepts a string and delete all the leading spaces.

Week-9 Write a program to accept a string from user and display number of vowels, consonants, digits and special characters present in each of the words of the given string.

Week-10
1) Write a C program to define a union and structure both having exactly the same numbers using the sizeof operators print the sizeof structure variables as well as union variable
2) Declare a structure *time* that has three fields *hr, min, secs.* Create two variables,*start_time*and*end_time.* Input there values from the user. Then while *start_time* is not equal to *end_time* display GOOD DAY on screen.

Week-11
1) Write a program to read in an array of names and to sort them in alphabetical order. Use sort function that receives pointers to the functions strcmp, and swap, sort in turn should call these functions via the pointers.
2) Write a program to read and display values of an integer array. Allocate space dynamically for the array using the *malloc().*
3) Write a program to calculate area of a triangle using function that has the input parameters as pointers as sides of the triangle.

Week-12
1) Two text files are given with the names text1 and text2. These files have several lines of text. Write a program to merge (first line of text1 followed by first line of text2 and so on until both the files reach the end of the file) the lines of text1 and text2 and write the merged text to a new file text3.
2) Write a program to split a given text file into n parts. Name each part as the name of the original file followed by .part<**n**> where n is the sequence number of the part file.

Reference Books:

1. Computer Science, A Structured Programming Approach Using C by Behrouz A. Forouzan& Richard F. Gilberg, Third Edition, Cengage Learning
2. C Programming A Problem-Solving Approach, Behrouz A. Forouzan& E.V. Prasad, F. Gilberg, Third Edition, Cengage Learning
3. Programming with C RemaTheraja, Oxford
4. "C Test Your Skills", Kamthane, Pearson Education
5. Programming in C: A Practical Approach, Ajay Mittal, Pearson
6. Problem solving with C, M.T.Somasekhara, PHI
7. C Programming with problem solving, J.A. Jones & K. Harrow,Dreamtech Press
8. Programming withc, Byron S Gottfried, Jitender Kumar Chhabra, TMH, 2011

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****** DEPARTMENT OF CIVIL ENGINEERING ******
I B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A25202	ENGINEERING PHYSICS LABORATORY	--	1	3	2

COURSE OBJECTIVES	
1	The Objective of this course is to make the students gain practical knowledge to correlate with the theoretical studies.
2	To develop practical applications of engineering materials and use of principle in the right way to implement the modern technology.
3	To train engineering students on basis of measurements and the instruments
4	To equip the students with practical knowledge in electronic, optics, and heat experiments

COURSE OUTCOMES	
CO1	On Completion of this course, students are able to – Develop skills to impart practical knowledge in real time solution.
CO2	Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
CO3	Understand measurement technology, usage of new instruments and real time applications in engineering studies.
CO4	The student will be able to analyze the physical principle involved in the various instruments, also relate the principle to new application.
CO5	The various experiments in the areas of optics, mechanics and thermal physics will nurture the students in all branches of Engineering.

LIST OF EXPERIMENTS

Any TEN of the following experiments has to be performed during the SEMESTER

1. Determination of wavelengths of various colours of mercury spectrum using diffraction grating in normal incidence method
2. Determination of dispersive power of prism
3. Determination of thickness of thin object by wedge method
4. Determination of radius of curvature of lens by Newton's rings
5. Laser : Diffraction due to single slit
6. Laser : Diffraction due to double slit
7. Laser: Determination of wavelength using diffraction grating
8. Determination of Numerical aperture of an optical fiber
9. Meldes experiment: Determination of the frequency of tuning fork
10. Sonometer: Verification of the three laws of stretched strings
11. Energy gap of a material using p-n junction diode
12. Electrical conductivity by four probe method
13. Hall effect: Determination of mobility of charge carriers in semiconductor

14. B-H curve
15. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method
16. Determination of dielectric constant and Curie temperature of a ferroelectric material

Note: Out of 10 experiments, two experiments will be performed using virtual laboratory

Data Books Required: Nil

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I Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Lab	L	T	P	C
17A20102	**STRENGTH OF MATERIALS LAB**	--	1	3	2

OBJECTIVE: *The object of the course to make the student to understand the behavior of materials under different types of loading for different types structures.*

LIST OF EXERCISES:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test.
5. Hardness test.
6. Spring test.
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

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II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A35101	**MATHEMATICAL METHODS**	2	2	--	3

COURSE DESCRIPTION:

Fundamentals of matrix theory;numerical solutions of equations curve fitting; interpolation; numerical differentiation and integration;numerical solutions of ordinary differential equations.

COURSE OBJECTIVES:

CEO 1:To impart basic knowledge on ranks of matrices, systems of linear equations,numerical methods to solve algebraic and transcendental equations,differential equations, numerical differentiation and integration.

CEO 2:To develop skills in analyzing various numerical techniques, designing mathematical models, numerical techniques for engineering problems and
fitting of curves toexperimentaldata.

COURSE OUTCOMES: Aftercompletion of the course a successful student is able to

CO 1 :Acquire basic knowledge in

(a) Finding the rank of matrices and analyzing them.
(b) Solving algebraic and transcendental equations by various numerical methods.
(c) Fitting of various types of curves to the experimental data.
(d) Estimating the missing data through interpolation methods.
(e) Identification of errors in the experimental data
(f) Finding the values of derivatives and integrals through various numerical methods.
(g) Solving differential equations numerically when analytical methods fail to hold.

CO 2 :Develop skills in analyzing the

(a) Methods of interpolating a given data
(b) Properties of interpolating polynomials and derive conclusions
(c) Properties of curves of best fit to the given data
(d) Algebraic and transcendental equations through their solutions
(e) Properties of functions through numerical differentiation and integration
(f) Properties of numerical solutions of differential equations

CO 3 :Develop skills in designing mathematical models for

(a) Fitting geometrical curves to the given data
(b) Solving differential equations
(c) Constructing polynomials to the given data and drawing inferences.

CO 4 :Develop numerical skills in solving the problems involving

(a) Systems of linear equations
(b) Fitting of polynomials and different types of equations to the experimental data
(c) Derivatives and integrals
(d) Ordinary differential equations

CO 5 : Use relevant numerical techniques for

(a) Diagonalising the matrices of quadratic forms
(b) Interpolation of data and fitting interpolation polynomials
(c) Fitting of different types of curves to experimental data
(d) Obtaining derivatives of required order for given experimental data

UNIT–I :

MATRIX THEORY (11 periods)

Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties,Diagonalization.Quadratic form, reductions to canonical form using orthogonal transformation method and nature of Quadratic forms.

UNIT-II

NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING (9 periods)

Solutions of Algebraic and Transcendental equations by Regula falsi method, Newton – Raphson's method. Solution of linear simultaneous equation: Crout's triangularisation method, Gauss - Seidal iteration method.Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.

UNIT- III

INTERPOLATION (7 periods)

Interpolation, difference operators and their relationships, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

UNIT-IV

NUMERICAL DIFFERENTIATION AND INTEGRATION(7 periods)

Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpsons $1/3^{rd}$ rule and $3/8^{th}$ rule.

UNIT- V

NUMERICAL SOLUTIONS OF DIFFERENTIAL EQUATIONS(11 periods)

Numerical solutions of first order Initial value problems using Taylor series method, Euler's, modified Euler's, Runge – Kutta method (4^{th}order only) and Milne's predictor – corrector method. Numerical solutions of Laplace equation using finite difference approximation.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.

REFERENCES:

1. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S. Chand publication.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
5. Advanced Engineering Mathematics 3rd Edition, by R.K.Jain & S.R.K.Iyengar, Narosa publishers

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II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A30101	**STRENGTH OF MATERIALS – II**	3	2	--	4

OBJECTIVE: *Study of the subject provides the understanding of principal stress, strains, springs, columns and structures.*

UNIT – I

PRINCIPAL STRESSES AND STRAINS: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

THEORIES OF FAILURES: Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT – II

THIN CYLINDERS & THICK CYLINDERS : Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – Changes in dia, and volume of thin cylinders – Thin spherical shells.

Introduction Lame's theory for thick cylinders – Derivation of lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

UNIT – III

TORSION OF CIRCULAR SHAFTS – Theory of pure torsion – Derivation of Torsion equations: – Assumptions made in the theory Theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

SPRINGS:

Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple –springs in series and parallel – Carriage or leaf springs.

UNIT – IV

COLUMNS AND STRUTS : Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns – assumptions – derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.

UNIT – V

UNSYMETRICAL BENDING : Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid - Location of neutral axis – Deflection of beams under unsymmetrical bending.

BEAMS CURVED IN PLAN : Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semicircular beam simply-supported on three equally spaced supports.

TEXT BOOKS:

(1) A Text book of Strength of materials by R.K.Bansal – Laxmi Publications (P) Ltd., New Delhi.
(2) Strength of Materials by S.S. Bhavikatti – Vikas publishers
(3) Strength of Materials by R.Subramanian, Oxford University Press.
(4) Strength of Materials by D.S. Prakasa rao, University press.

REFERENCES :

(1) Mechanics of Structures, by Ghosh& Datta, New Age Pubilishers
(2) Strength of Materials by B.C.Punmia.- Laxmi publications
(3) Strength of Materials by Schaum's out line series – Mc.Graw hill International Editions.
(4) Strength of Materials by S.Ramkrishna and R.Narayan – Dhanpat Rai Publications.
(5) Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Dew Delhi.

Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd

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COLLEGE OF ENGINEERING:: ANANTAPUR

II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A30102	**SURVEYING-I**	3	-	--	3

OBJECTIVE: *To ensure that the student develops knowledge of the basic and conventional surveying instruments, principles behind them, working of the instruments, plotting of the area from the field measurements, determination of the area and the theory behind curves.*

UNIT – I

BASIC CONCEPTS: Surveying – History; Definition; primary divisions, Classification, Principles of surveying Plan and map; Basic Measurements; Instruments and Basic methods; units of measurement, Scales used for Maps and plans, Duties of a surveyor. Errors: Accuracy and Precision Sources and types of errors, theory of Probability, Rounding of numbers.

CHAIN SURVEYING: Instruments for chaining, Ranging out, chaining a line on a flat ground; Chaining on an uneven or a sloping ground; Chain & Tape corrections; Degree of accuracy. Principles of chain surveying; Basic definitions; Well-Conditioned Triangle, Field book, Field work; Offsets, Cross Staff survey; obstacles in chain survey-problems, Conventional signs.

UNIT-II

COMPASS SURVEY: Introduction, Bearings and angles, Designation of bearings, Conversion of bearings from one system to the other, fore bearing and back bearing, , Calculation of bearing from angles, Theory of Magnetic compass (i.e. Prismatic compass), Temporary adjustments of compass-Magnetic Declination, Local attraction-Related Problems-Errors in compass survey.

PLANE TABLE SURVEYING: Introduction, Accessories, Working operations, Methods of plane tabling, Three point problem-Mechanical method -Graphical method, Two point problem, Errors in plane tabling.

UNIT-III

LEVELLING: Introduction, basic definitions, methods of leveling, leveling instruments: dumpy level, levelling staff, Temporary adjustments of dumpy level, theory of simple and differential leveling, Level field book, Classification of direct leveling methods, Reciprocal leveling, Profile leveling and Cross sectioning, Curvature and Refraction, Difficulties in leveling, errors in leveling, Degree of Precision.

CONTOURING: Introduction, contour interval, Characteristics of contours Methods of locating contours - Direct and indirect methods; Interpolation and sketching of contours, Contour gradient-Uses of contour maps.

UNIT-IV

THEODOLITE: Vernier Theodolite: Basic definitions; Fundamental lines and desired relations; Temporary adjustments; Measurement of a horizontal angle; Repetition and Reiteration methods of horizontal angle measurement. Measurement of vertical angle; Sources of errors in Theodolite survey.

TRAVERSE SURVEYING: Introduction, Selection and marking of traverse stations,methods of traversing, traversing by free needle and fast needle method, traversing by direct observation of angles, checks in closed traverse, closing error, methods of balancing the traverse, Gale's traverse table, Omitted measurements.

UNIT-V

COMPUTATION OF AREAS AND VOLUMES: methods of determining areas, areas by sub-division into triangles, areas from offsets to a base line: regular and irregular intervals, area

by double meridian distances, area by co-ordinates. embankments and cutting for a level section, two level sections, three level section and multi level section, volume of earth work from contour plan, capacity of a reservoir , volume of barrow pits.

MINOR INSTRUMENTS: uses and working of the minor instruments: hand level, line ranger, optical square, abney level, clinometers, pantagraph, sextant and planimeter.

TEXT BOOKS:

(1) Surveying (Vol – 1,2 &3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) Ltd., New Delhi
(2) Text book of surveying by C.Venkataramaiah, Universities Press.
(3) Advanced Surveying by SatheeshGopi, R.Shanta Kumar and N.Madhu, Pearson education.

REFERENCES:

(1) Chandra AM, "Plane Surveying", New age International PVt.Ltd., Publishers, New Delhi, 2002
(2) Duggal S.K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co.Ltd. New Delhi, 2004.
(3) Arora K R "Surveying (Vol-1 & 2), Standard Book House, Delhi, 2004
(4) Surveying and Levelling by Kanetkar T.P., and Kulkarni, Vols. I and II, United Book Corporation, Pune, 1994
(5) Surveying and leveling by R.Subramaniah, Oxford university press, New Delhi.
(6) Surveying by Mimi Das Saikia, PHIPubilications.

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II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A30103	**FLUID MECHANICS**	3	2	--	4

OBJECTIVE: *This subject introduces the basic concepts of fluids, their behavioural properties, analyzing the fluid flows using primary equations. This subject further deals with various flow measuring devices and concepts of boundary layer flows.*

UNIT – I

INTRODUCTION: Dimensions and units – physical properties of fluids, specific gravity, viscosity, surface tension and capillarity, vapor pressure and their influences on fluid motion. Newtonian and non Newtonian fluids.Fluid Pressure at a Point; Pascal's law, Hydrostatic law, Atmospheric, Absolute and gauge pressure; Hydrostatic paradox, Pressure measurement manometers; Simple, differential and Micro Manometers

HYDROSTATIC FORCES ON SURFACES: Total Pressure and Centre of Pressure: on Horizontal Plane Surface; Vertical Plane Surface; Inclined Plane Surface and Curved Surfaces.

UNIT-II

BUOYANCY: Buoyancy; Buoyant Force and Centre of Buoyancy, Stability of submerged bodies and floating bodies; Metacentre and metacentric height, analytical method for metacentric height.

KINEMATICS OF FLUID MOTION: Methods of describing fluid motion; Classification of flow; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one dimensional flows; Irrotational and rotational flows; Streamline; Pathline; Streakline; Equation for acceleration; Convective acceleration; Local acceleration; Continuity equation; Velocity potential and stream function; Flownet; Vortex flow – free vortex and forced vertex flow.

UNIT-III

DYNAMICS OF FLUID FLOW: Forces acting on a Fluid in Motion; Euler's equation of motion; .Bernoulli's equation ; Energy correction factor; Momentum principle; Force exerted on a pipe bend.

FLOW MEASUREMENTS IN PIPES: Discharge through Venturi Meter; Discharge through Orifice Meter; Discharge through flow nozzle; Measurement of velocity by Pitot tube,pitot-static tube.

UNIT-IV

FLOWTHROUGH ORIFICES AND MOUTHPIECES: Flow through Orifices: Classification of Orifices; Determination of coefficients for an Orifice Flow through large rectangular Orifice; Flow through submerged Orifice – fully sub-merged and Partially sub-merged. Classification of Mouthpieces; Flow through external and internal cylindrical Mouthpiece

FLOW OVER NOTCHES & WEIRS: Classification of Notches and Weirs; Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Cipolletti weir, Broad crested weir.

UNIT-V

ANALYSIS OF PIPE FLOW: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length;

Hydraulic power transmission through a pipe; Siphon; Pipes in series, parallel & branched pipes.

LAMINAR & TURBULENT FLOW IN PIPES: Reynolds's experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe(Hazen poiseuille equation). Characteristics of turbulent flow, Prandtl's mixing length theory, Hydro dynamically smooth and rough boundaries, Velocity distribution, Friction factor for pipe flow.

TEXT BOOKS:

(1) Fluid Mechanics by Modi and Seth, Standard book house.
(2) A text of Fluid mechanics and hydraulic machines by Dr.R.k.Bansal – Laxmi Publications (P) Ltd., New Delhi.
(3) Fluid Mechanics and Machinery by D.RamaDurgaiah, New Age International.

REFERENCES:

(1) Fluid Mechanics and Machinery, CSP Ojha, Oxford Higher Education
(2) Fluid mechanics and machinery by Garde, New Age Pubilishers.
(3) Theory and applications of fluid mechanics by K.Subramanyam, TMH Pubilications, New Delhi.
(4) Principles of Fluid Mechanics and Fluid Machines by M.Narayana Pillai, Universities Press.
(5) Introduction to Fluid Machines by S.K.Som&G.Biswas .Tata Mc.Grawhill publishers PVt.Ltd.
(6) Fluid Mechanics by A.K.Mohanty, Prentice Hall of India PVt.Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING:: ANANTAPUR

II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A30104	**BUILDING MATERIALS AND CONSTRUCTION**	3	-	--	3

OBJECTIVES: *To give the students a basic idea about the traditional and modern construction materials a brief knowledge on building components and its construction methodologies.*

UNIT – I

INTRODUCTION TO BUILDING MATERIALS

Traditional & Organic Building Materials – Stone – Dressing of Stones – Modern Building Materials – Bricks – Manufacturing process – Ceramic Products – Manufacturing Process – Building Materials for Low Cost Housing – Utilisation of Wastes for Alternative Building Materials –Sustainable Materials in Construction –National Standards.

UNIT – II

GLASS:

Introduction – Functions of Glass in Buildings – Constituents and Classification of Glass – Manufacturing Process –Properties of Glass – Common Types of Glass – Special Glass – Advantages and Disadvantages of Glass – National Standards.

PLASTIC:

Introduction – Polymerisation – Classification of Plastics – Commonly Used Plastics – Moulding and Fabricating for Plastic Products – Applications – Advantages – Disadvantages – Intelligent Use of Plastics in Buildings – National Standards.

UNIT – III

INSULATING MATERILAS

Thermal Insulating Materials: Introduction – Thermal Insulation – Heat Transfer Fundamentals – Thermal Properties of Insulating Materials – Selection of Insulating Materials – Classification of Insulation materials – Reflective Insulation Systems – Commonly Used Building Insulation Materials – Insulation that Should not be Used – National Standards.

Sound Insulating Materials: Introduction – Basics of Acoustics – Sound Absorption or Insulation – Green Insulation – National Standards.

UNIT – IV

STRUCTURAL COMPONENTS:–

Foundations – classification of Foundations – consideration in selection of foundation types – Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars – Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures – Components – Construction Procedure – Panel walls – National Standards.

UNIT – V

INTERNAL CONSTRUCTION AND FINISHES

Internal elements – Internal walls – Construction joints – Internal walls, fire protection – separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door sets – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of Paints – Types of Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints –Emulsion

Paints – Whitewash and Colourwash – Application of Paints –Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards.

TEXT BOOKS:

1. Building Material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
3. A Textbook on Building Construction by S.K.Sharma, S.Chand Pubilishers.
4. Building Materials by M.L.Gambhir, TMH Pubilishers.

REFERENCES:

1. Building construction by W.B.Mckay, Vol.I, II, III & IV Pearson Publications, 2013 edition.
2. R.Chudly "Construction Technology "– Volumes I and II" 2nd Edition, Longman, UK, 1987.
3. Building materials by S.C.Rangawala, Charotar Pubilishing House, Anand- INDIA.
4. Building Construction by S.C.Rangawala, Charotar Pubilishing House, Anand- INDIA
5. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
6. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING:: ANANTAPUR

II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A39901	**HUMAN VALUES & PROFESSIONAL ETHICS (AUDIT)**	2	-	--	-

OBJECTIVE

• To create an awareness on Engineering Ethics and Human Values.
• To instill Moral and Social Values and Loyalty
• To appreciate the rights of Others

Students will be able to:

- identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
- identify the multiple ethical interests at stake in a real-world situation or practice
- articulate what makes a particular course of action ethically defensible
- assess their own ethical values and the social context of problems
- identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
- demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work
- integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

Unit I: HUMAN VALUES

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy –Self Confidence Character – Spirituality.

Unit II: ENGINEERING ETHICS

Senses of 'Engineering Ethics- Variety of moral issued – Types of inquiry – Moral dilemmas – Moral autonomy –Kohlberg's theory- Gilligan's theory- Consensus and controversy – Models of professional roles- Theories about right action- Self interest - Customs and religion –Uses of Ethical theories – Valuing time –Co operation – Commitment.

Unit III :**ENGINEERING AS SOCIAL EXPERIMENTATION**

Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking respect for persons.

UNIT IV: ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk- Safety and the Engineer- Designing for the safety- Intellectual Property rights(IPR).

UINIT V: GLOBAL ISSUES

Globalization – Cross culture issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics and Research – Analyzing Ethical Problems in research – Intellectual property Rights(IPR).

Text Books

1. “Engineering Ethics includes Human Values” by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2. “Engineering Ethics” by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
3. “Ethics in Engineering” by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill– 2003.
4. “Professional Ethics and Morals” by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
5. “Professional Ethics and Human Values” by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.
6. “Professional Ethics and Human Values” by Prof.D.R.Kiran
7. “Indian Culture, Values and Professional Ethics” by PSR Murthy-BS Publication

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING:: ANANTAPUR

II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A30105	**SURVEYING LAB - I**	-	1	3	2

OBJECTIVE: *To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.*

LIST OF EXERCISES:

(1) Survey of an area by chain survey (Closed traverse) & Plotting
(2) Chaining across obstacles
(3) Determination of distance between two inaccessible points with compass.
(4) Surveying of a given area by prismatic compass (Closed traverse) and plotting after adjustment.
(5) Radiation method, intersection methods by plane Table survey
(6) Two point and three point problems in plane table survey.
(7) Traversing by plane table survey
(8) Fly leveling (differential leveling)
(9) An exercise of L.S. and C.S. and plotting.
(10) Two exercises on contouring.

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II Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A35104	**EXPLORATORY DATA ANALYSIS LAB**	-	1	3	2

COURSE DESCRIPTION: Statistical and Numerical Techniques – Measures of central tendency/dispersion, Curve fitting by method of least squares, linear regression and correlation, ANOVA; Data analysis using R, Numerical Solution of algebraic, transcendental and ordinary differential equations, Inverse and Eigen values of a matrix – Numerical method.

CEO 1: To impart knowledge on the application of Statistical and Numerical techniques – analysis of data, solution of algebraic, transcendental and differential equations, Matrices, transformation from time domain to frequency domain.

CEO 2: To develop skills in analyzing the data using appropriate statistical tools, solving algebraic and differential equations, matrices using appropriate numerical methods, obtaining amplitude and frequency of a time signal

COURSE OUTCOMES: After completion of the course, a successful student is able to

CO 1 : Develop skills in designing appropriate statistical method for
- (a) Determining the measures of central tendency/dispersion.
- (b) Box plot representation using Origin Software.
- (c) Finding a best fit curve to a given set of data.
- (d) Determining the coefficient of correlation and linear regression.

CO 2 : Develop skills in using suitable statistical technique for
- (a) Analyzing variance (ANOVA) for one variable.
- (b) Determination of R function for a given set of data and appropriate interpretation.
- (c) Representing three dimensional data in contour plot using MATLAB.

CO 3 : Transform a time signal/pulse to a frequency domain using concepts of Fourier series

CO 4 : Develop skills using suitable numerical technique for
- (a) Solving algebraic, transcendental and differential equations.
- (b) Determining Eigen Values and dominant Eigen value of a matrix.
- (c) Differentiation, integration and solution of differential equations.

LIST OF EXPERIMENTS

Required softwares: ORIGIN, MATLAB, R-LAB.

I. Statistical and Fourier series Techniques:

To a given set of data:

1. Determine measures of central tendency/dispersion - Mean, Median, Mode, Range and Variance;
   Box plot representation using Origin Software.
2. Fit a straight line, parabola, exponential curve.
3. Determine the coefficient of correlation and regression.
4. Analysis of variance (ANOVA) for one variable.
5. Determine R function and give interpretation.

6. Transforming signal in time domain into frequency domain.
7. Represent in contour plot using matlab.

II. Numerical Techniques:

8. Solving algebraic and transcendental equations using Regula - Falsi and Newton - Raphson methods.
9. Determine the inverse of a matrix; solving system of algebraic equations using Gauss-Siedal method.
10. Determine the Eigen values of a matrix and dominant Eigen value by power method.
11. Numerical differentiation and integration.
12. Numerical solution of Ordinary differential equations - Modified Euler method & R-K fourth order
method.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING:: ANANTAPUR
II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A45401	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**	3	-	-	3

Course Objectives: The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to impart analytical skills in helping them take sound financial decisions for achieving higher organizational productivity.

Unit I: INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Demand Analysis: Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting -Relationship of Managerial Economics with Financial Accounting and Management.

UNIT II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function- Least cost combination- Short-run and Long- run production function- Isoquants and Isocosts, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - **Cost Analysis**: Cost concepts and cost behavior- Break-Even Analysis (BEA) -Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break- Even Point.

UNIT III: INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization.

UNIT IV: CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Shot term and Long term Capital - Estimating Working Capital Requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting

Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

UNIT V: INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping- Journal - Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

The students are required to submit any one of the following- two assignments/ a mini project/submission of any two case studies in the subject.

Learning Outcome: After completion of this course, the student will able to understand various aspects of Managerial Economics and analysis of financial statements and inputs therein will help them to make sound and effective decisions under different economic environment and market situations.

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Ahuja H.L Managerial economics. S.Chand, 3/e, 2013
3.

REFERENCES

1. Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International,. 2013.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING:: ANANTAPUR
II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A45101	**PROBABILITY AND STATISTICS**	**2**	**2**	**0**	**3**

COURSE DESCRIPTION: Random variables; mathematical expectations; probability distributions; correlation and regressions; statistical quality control; sampling distributions; tests for small and large samples and their significances.

COURSE OBJECTIVES:

CEO 1: To impart knowledge on random variables, probability distributions, sampling theory,statistical quality control and Queing models.

CEO 2: To develop skills in analyzing the data designing of statistical models, skills' in mathematical expectations, probability distributions, testing of hypothesis, significance, statistical quality control for problems in engineering.

COURSE OUTCOMES: After completion of the course, a successful student is able to:

CO 1: Acquire basic knowledge in
- (a) Probability distributions, correlation and regressions
- (b) Statistical quality control and testing of hypotheses
- (c) Simple linear regression
- (d) Tests of significance for small and large samples

CO 2: Develop skills for analyzing the data with
- (a) Mathematical expectations for realistic results
- (b) Probability distributions for practical situations.
- (c) Control charts of statistical quality control
- (d) Correlation and regression concepts
- (e) Suitable tests of significance for practical situations.

CO3: Develop skills in designing
- (a) Probability distributions
- (b) Limitations of statistical quality control
- (c) control charts,
- (d) X, R, np, and c charts

CO 4: Develop analytical skills forsolvingproblems involving
- (a) Probability distributions, means,variances and standard deviations
- (b) Statistical techniques employed for quality
- (c) Sampling techniques for decision making
- (d) Tests of significances for small and large samples

CO 5 : Use relevant probability and statistical techniques for
- (a) Mathematical expectations of desired results

(b) Fitting probability distributions for experimental data.
(c) Quality control and testing of hypothesis.
(d) Formation of queues and their properties.

UNIT - I:

Random variable and Distributions(9 periods)

Random Variables: Discrete and Continuous random variables, Distribution function of random variable, Properties, Probability mass function, Probability density function, Mathematical Expectation-Mean and Variance. Distribution functions. Binomial and poison distributions Normal distribution – correlation and linear regressions- Related properties.

UNIT – II

Testing of Hypothesis and Large Samples(9 periods)

Test of Hypothesis: Population and Sample - Statistical hypothesis - Null and Alternative Hypothesis, Type I and II errors, Level of Significance, Critical region, Degrees of freedom.Test of significance - Test of Significance for Single Proportion, Difference of Proportions, Single Mean, Difference of Means.

UNIT – III

Small Sample Tests(9 periods)

Small samples - t- test for one sample and two sample problem and paired t-test, F-test and Chi-square test for testing of goodness of fit. Contingency table, Chi-Square Test for Independence of Attributes.

UNIT – IV

Statistical quality control (9 periods)

Statistical Quality Control: Concept of quality of a manufactured product -Defects and Defectives - Causes of variations - Random and assignable - The principle of Shewhart Control Chart-Charts for attribute and variable quality characteristics- Constructions and operation of $\overline{X}$ - Chart, R-Chart,

p - Chart and C-Chart.

UNIT – V

Queuing Theory (9 periods)

Queuing Theory: Pure Birth and Death process, M/M/1 & M/M/S & their related simple problems.

TEXT BOOKS:

1. Probability & Statistics by E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.
2. Probability & Statistics for engineers by Dr. J. Ravichandran WILEY-INDIA publishers.

REFERENCES:

1. Probability & Statistics by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publications.
2. Statistical methods by S.P. Gupta, S.Chand publications.
3. Probability & Statistics for Science and Engineering by G.Shanker Rao, Universities Press.
4. Probability and Statistics for Engineering and Sciences by Jay L.Devore, CENGAGE.
5. Probability and Statistics by R.A. Jhonson and Gupta C.B.
6. Fundamentals of Statistics. 7th Revived Edition by S.C Gupta, Himalaya Publishing House.

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COLLEGE OF ENGINEERING:: ANANTAPUR
II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A40101	**HYDRAULICS AND HYRAULIC MACHINERY**	2	2	-	3

OBJECTIVE: *The main objective of this course is to deal with the concepts of flow through open channels and their applications and the principles of hydraulic machines and hydraulic models.*

UNIT – 1

OPEN CHANNEL FLOW-UNIFORM FLOW: Introduction, Classification of flows, Types of channels; Flow analysis: The Chezy equation, Empirical formulae for the Chezy constant, Hydraulically efficient channel sections: Rectangular, Trapezoidal, Triangular and Circular channels; Velocity distribution; Energy and momentum correction factors. Application of Bernoulli's equation to open channel flow.

OPEN CHANNEL FLOW- NON – UNIFORM FLOW: Concept of specific energy; Specific energy curves; Critical flow; Critical flow in a rectangular channel; Critical slope; discharge curve, Different slope conditions; Channel transitions- Reduction in width of a rectangular channel, Raised bottom in a rectangular channel, venture flume, Momentum principle applied to open channel flow; Specific force; Specific force curve.

UNIT – II

OPEN CHANNEL FLOW- GRADUALLY VARIED FLOW: Introduction, Dynamic equation; Dynamic equation for GVF in wide Rectangular channel, classification of channel bottom slopes, Surface Profiles; Characteristics of surface profiles, Back water Curves and Draw down curves; Examples of various types of water surface profiles; Control section, Computation of surface profiles by single step method.

OPEN CHANNEL FLOW- RAPIDLY VARIED FLOW: Hydraulic jump; Elements and characteristics of hydraulic jump; Hydraulic jump in rectangular channels, height and length of the jump, Energy loss in a hydraulic jump, Types of hydraulic jump; applications of hydraulic jump; Location of hydraulic jump,.

UNIT – III

IMPACT OF JETS: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for

Work done and efficiency-Angular momentum principle, Torque and head transferred in roto dynamic machines.

HYDRAULIC TURBINES-I: Introduction, head and efficiencies of hydraulic turbines, Classification of turbines; pelton wheel: parts, Velocity triangles, work done and efficiency,

working proportions, design of pelton wheel. Radial flow reaction turbines: velocity triangles and work done for inward radial flow turbine, degree of reaction, discharge, speed ratio, flow ratio.

UNIT – IV

HYDRAULIC TURBINES-II: Francis turbine: main components and working, work done and efficiencies, design proportions; design of Francis turbine runner. Kaplan turbine: main components and working, working proportions. Draft tube: theory and efficiency; specific speed, unit quantities, characteristic curves of hydraulic turbines. Cavitation: causes, effects.

CENTRIFUGAL PUMPS: Introduction, component parts and working of a centrifugal pump, work done by the impeller; heads, losses and efficiencies; minimum starting speed; Priming ;specific speed; limitation of suction lift, net positive suction head(NPSH);Performance and characteristic curves; Cavitation effects ;Multistage centrifugal pumps; troubles and remedies.

UNIT – V

DIMENSIONAL ANALYSIS AND SIMILITUDE: Introduction, dimensions; Dimensional homogeneity; Methods of dimensional analysis- Rayleigh's method; Buckingham – Pi theorem; model analysis; similitude-types of similarities; Dimensionless numbers; Model laws ;Partially submerged objects; types of models; Scale effect.

BOUNDARY LAYER THEORY& DRAG AND LIFT: Boundary layer – concepts, Prandtl's contribution, Characteristics of boundary layer along a thin flat plate, laminar and turbulent Boundary layers, separation of BL. expression for drag and lift; Lift and Drag Coefficients; pressure drag and friction drag; Streamlined and bluff bodies.

TEXT BOOKS :

(1) Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.
(2) A text of Fluid mechanics and hydraulic machines by Dr.R.K.Bansal – Laxmi Publications (P) Ltd., New Delhi.

REFERENCES :

(1) Fluid Mechanics & Fluid Machines by Narayana Pillai, universities press.
(2) Open channel flow by srinivasan, Oxford University Press
(3) Fluid Mechanics And Machenary-Kothandaraman, New Age Pubilishers
(4) Open Channel flow by K.Subramanya.Tata Mc.Grawhill Publishers.
(5) Elements of Open channel flow by Ranga Raju, Tata MC.Graw Hill, Publications.
(6) Fluid mechanics and fluid machines by Rajput, S.Chand & Co.
(7) Open Channel flow by V.T.Chow, Mc.Graw Hill book company
(8) Hydraulic Machines by Banga & Sharma Khanna Publishers.
(9) Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria & Sons.

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COLLEGE OF ENGINEERING:: ANANTAPUR
II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A40102	**STRUCTURAL ANALYSIS – I**	2	2	-	3

OBJECTIVE: *To make the students to understand the principles of analysis of structures of static and moving loads by various methods.*

UNIT – I

ENERGY THEOREMS : Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT – II

ANALYSIS OF INDETERMINATE STRUCTURES : Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano's theorem..

UNIT – III

FIXED BEAMS & CONTINUOUS BEAMS : Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT – IV

SLOPE-DEFLECTION: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports- Analysis of single bay, single storey, portal frame including side sway .

UNIT – V

MOMENT DISTRIBUTION METHOD Introduction to moment distribution method-application to continuous beams with and without settlement of supports. Analysis of single storey portal frames – including Sway

TEXT BOOKS :

(1) Analysis of Structures – Vol-I&II by V.N.Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
(2) Structural Analysis by S S Bhavikatti – Vikas Publishing House.

(3) Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

REFERENCES :

(1) Structural analysis – Hibbler – Pearson education
(2) Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
(3) Structural Analysis – D.S.Prakasa rao - Univeristy press.
(4) Introduction To Structural Analysis-Nautial- New Age Pubilishers
(5) Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, NewDelhi.
(6) Structual analysis Vol.I and II by Dr. R.Vaidyanathan and Dr.P Perumal – Laxmi publications.
(7) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING:: ANANTAPUR
II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A40103	**SURVEYING – II**	3	-	-	3

OBJECTIVE: *To ensure that the student develops knowledge in the working of advanced instruments, setting out of curves from the field measurements and basic knowledge on remote sensing*

UNIT-I

TRIGONOMETRIC LEVELLING : Introduction; Determination of the level of the top of an object, When its base is accessible and When its base is not accessible; Determination of the height of the object when the two instrument stations are not in the same vertical plane; Axis signal correction; Difference in elevation by single observation and reciprocal observations.

UNIT-II

TACHEOMETRIC SURVEYING: Definition, Advantages of Tacheometric surveying-Basic systems of tacheometric measurement , Principle of stadia measurements, Determination of constants K and C, Inclined sight with staff vertical; Inclined sight with staff normal to the line of sight, Movable hair method, Tangential method, Subtanse bar, Errors in Tacheometry.

UNIT-III

TRIANGULATION: Principles of triangulation, Uses of triangulation survey; Classification of triangulation; operations of triangulation survey; Signals and towers, Satellite station; Base line & Extension of the base line.

SETTING OUT WORKS: Introduction, Control stations; Horizontal control; Reference grid; Vertical control; Positioning of a structure; offset pegs, Setting out a foundation: reference pillars, batter boards, Setting out with a theodolite; Graded stakes; setting out a sewer; Setting out a culvert.

UNIT-IV

CURVES: Simple curves–Definitions and Notations, designation of a curve, Elements of simple curves, location of tangent points, selection of peg interval, Methods of setting simple curves(based on equipment) – Rankines method,Two theodolite method. Compound curves – Elements of compound curve, setting out compound curve. Reverse curves – Elements of reverse curve, relationship between various elements.

UNIT-V

ELECTRONIC DISTANCE MEASUREMENTS: Introduction, Basic concepts-electromagnetic waves, basic definitions, phase of the wave ,units, types of waves; distance from measurement of transit time, Computing the distance from the phase differences, , EDM

instruments, electronic theodolites, total station-models, fundamental measurements, recording, traversing, data retrieval.

REMOTE SENSING: Introduction, Principle of Remote sensing, EM Radiation and the atmosphere, interaction of EM radiation with earth's surface, remote sensing observation platforms, sensors, applications of remote sensing. Geographical Information System: Introduction and principle of Geographical Information System,components of GIS, applications.

TEXT BOOKS:

1. Surveying Vol. 1 & II by Dr. K. R. Arora; Standard Book House;

2. Surveying Vol-I&II by B.C. Punmia ,Laxmi Publications

3. Higher Surveying by Chandra, New age Pubilishers

REFERENCE BOOKS:

1. Surveying Vol. 1and 2 – By S.K. Duggal. Tata Mc. Graw Hill Publishing Co.

2. Surveying and Levelling by Kanetkar T.P., and Kulkarni , Vols. I and II, United Book Corporation, Pune, 1994.

3.Principles of GIS for land resource assessment by P.A. Burrough –Clerendon Press, Oxford.

4. Advanced Surveying by Mahajan, Santhos K. Dhanpat Rai & Sons, Nai Sarak, Delhi, 1987.

5. Remote sensing and Image Interpretation by Lillesand,T.M.,and Kiefer R.W., John Wiley

and Sons, Inc, New York,1997

6. Advanced Surveying: Total Station, GIS and remote Sensing by R. Sathikumar, Satheesh Gopi and N. Madhu, Pearson Education, India

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
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II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A40104	**FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**	-	1	3	2

OBJECTIVE: *The object of the course to make the students understand the fluid flow concepts and get familiarity with flow measuring devices.*

SYLLABUS :

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Varification of Bernoulli's equation.
8. Impact of jet on vanes.
9. Study of Hydraulic jump.
10. Performance test on Pelton wheel turbine.
11. Performance test on Francis turbine.
12. Efficiency test on centrifugal pump.

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II Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A40105	**SURVEYING LAB – II**	-	1	3	2

OBJECTIVE: *To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.*

LIST OF EXERCISES:

1. Study of theodolite in detail – practice for measurement of horizontal and vertical angles.
2. Measurement of horizontal angles by method of repetition and reiteration.
3. Trigonometric Leveling – Heights and distance problem (Two Exercises).
4. Heights and distance using Principles of tachometric surveying (Two Exercises)
5. Curve setting – different methods. (Two Exercises)
6. Setting out works for buildings & pipe lines.
7. Determination of area using total station.
8. Traversing using total station.
9. Contouring using total station.
10. Determination of remote height using total station.
11. Distance, gradient, Diff. height between tow inaccessible points using total stations.

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III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50101	**DESIGN OF STEEL STRUCTURES**	3	2	-	4

OBJECTIVE: *To understand design specifications, loading and design procedures of different steel structures as per BIS specifications.*

UNIT – I

Materials – Making of iron and steel – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads–and combinations loading wind loads on roof trusses, behavior of steel, local buckling. Concept of limit State Design – Different Limit States as per IS 800 -2007 – Design Strengths- deflection limits – serviceability - Bolted connections – Welded connections – Design Strength – Efficiency of joint – Prying action Types of Welded joints - Design of Tension members – Design Strength of members.

UNIT – II

Design of compression members – Buckling class – slenderness ratio / strength design – laced – battened columns –column splice – column base – slab base.

UNIT – III

Design of Beams – Plastic moment – Bending and shear strength laterally / supported beams design – Built up sections – large plates Web buckling Crippling and Deflection of beams, Design of Purlin.

UNIT – IV

Design of eccentric connections with brackets, Beam end connections – Web angle – Un-stiffened and stiffened seated connections (bolted and Welded types) Design of truss joints

UNIT – V

Plate Girder: Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates stiffeners – splicings and connections.
Gantry Girder : Gantry girder impact factors – longitudinal forces, Design of Gantry girders.

Note: The students should prepare the following plates.
Plate 1 Detailing of simple beams
Plate 2 Detailing of Compound beams including curtailment of flange plates.
Plate 3 Detailing of Column including lacing and battens.
Plate 4 Detailing of Column bases – slab base and gusseted base
Plate 5 Detailing of steel roof trusses including particulars at joints.
Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS

1. limit state design of Steel Structures by Subramanyam.N, Oxford University press, New Delhi
2. Limit State Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi.

REFERENCES

1. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad.
2. Structural design in steel by Sarwar Alam Raz, New Age International Publishers, New Delhi
3. Design of Steel Structures by Edwin Gaylord,Charles Gaylord,James Stallmeyer, Tata Mc.Graw-Hill, New Delhi.

Codes/Tables:

IS Codes:

1) IS -800 – 2007
2) IS – 875 – Part III
3) Steel Tables.
4) Railway Design Standards Code.

and **steel tables** to be permitted into the examination hall.

Outcomes :

On completion of course -

1. Apply the IS code of practice for the design of steel structural elements
2. Design compression and tension members using simple and built-up sections
3. Students will be able to explain the behaviour and modes of failure of tension members and different connections.
4. Students will be able to analyze and design tension members, bolted connections, welded connections, compression members and beams.
5. Design welded connections for both axial and eccentric forces

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING:: ANANTAPUR

III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50102	**CONCRETE TECHNOLOGY**	3	-	-	3

OBJECTIVE: *Lot of advances is taking place in the concrete technology as par with development taking place in the engineering. The present day industry needs the knowledge of concrete technology thoroughly. The subject is designed to give the basic knowledge as well as latest developments in concrete technology.*

UNIT I

CEMENTS & ADMIXTURES: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Test`s on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – II

FRESH & HARDENED CONCRETE: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.Water / Cement ratio – Abram's Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compressive & tensile strength - Curing.Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests –

UNIT – III

SPECIAL CONCRETES: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON – Bacterial concrete(self healing concrete)

UNIT – IV

ELASTICITY, CREEP & SHRINKAGE:– Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage. Introduction to Non-destructive testing methods – Rebound Hammer – Ultra Pulse Velocity method – Pullout - Codal provisions for NDT.

UNIT – V

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method

TEXT BOOKS:

1. Properties of Concrete by A.M.Neville – Pearson publication – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004

REFERENCES:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete: Micro structure, Properties and Materials – P.K.Mehta and J.M.Monteiro, Mc-Graw Hill Publishers
3. Design of Concrete Mix by Krishna Raju, CBS pubilishers.

Outcomes:

After completing the course, the student should be able to do the following:

1. The students should be able to check and recommend different constituent of concrete.
2. The students should be able to test strength and quality of plastic and set concrete.
3. The students should have understanding of application admixture and its effect on properties of concrete.
4. The students should be able to design mix of concrete according to availability of ingredients and design needs.
5. The students should be able to test various strength of concrete by destructive and non-destructive testing methods.

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III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50103	**WATER RESOURCES ENGINEERING-I**	3	-	-	3

OBJECTIVE:

To study the concepts of

i. *Engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.*
ii. *Irrigation Engineering – Water utilization for Crop growth, canals and their designs.*

UNIT – I

INTRODUCTION TO HYDROLOGY: Engineering hydrology and its applications; Hydrologic cycle; precipitation- types and forms, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, presentation and interpretation of rainfall data.

DESCRIPTIVE HYDROLOGY: Evaporation- factors affecting evaporation, measurement of evaporation; Infiltration- factors affecting infiltration, measurement of infiltration, infiltration indices; Run off- Factors affecting run- off, Computation of run-off; Design Flood; Estimation of maximum rate of run-off; separation of base flow.

UNIT – II

HYDROGRAPH ANALYSIS: Hydrograph; Unit Hydrograph- construction and limitations of Unit hydrograph, Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; S-hydrograph.

GROUND WATER: Introduction; Aquifer; Aquiclude; Aquifuge; aquifer parameters-porosity, Specific yield, Specific retention; Divisions of sub–surface water; Water table; Types of aquifers; storage coefficient-coefficient of permeability and transmissibility; well hydraulics- Darcy's law; Steady radial flow to a well –Dupuit's theory for confined and unconfined aquifers; Tube well; Open well; Yield of an open well–Constant level pumping test, Recuperation test.

UNIT – III

IRRIGATION: Introduction; Necessity and Importance of Irrigation; advantages and ill effects of Irrigation; types of Irrigation; methods of application of Irrigation water; quality for Irrigation water. Duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty.

WATER REQUIREMENT OF CROPS: Types of soils, Indian agricultural soils, preparation of land for Irrigation; soil fertility; Soil-water-plant relationship; vertical distribution of soil moisture; soil moisture tension; soil moisture stress; various soil moisture constants; Limiting soil moisture conditions; Depth and frequency of irrigation; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; Kor depth and Kor period; crop seasons and crop rotation; Irrigation efficiencies; Determination of irrigation requirements of crops; Assessment of Irrigation water. Consumptive use of water-factors affecting consumptive use, direct measurement and determination by use of equations (theory only)

UNIT – IV

CHANNELS – SILT THEORIES: Classification; Canal alignment; Inundation canals; Cross–section of an irrigation channel; Balancing depth; Borrow pit; Spoil bank; Land width; Silt theories–Kennedy's theory, Kennedy's method of channel design; Drawbacks in Kennedy's theory; Lacey's regime theory- Lacey's theory applied to channel design; Defects in Lacey's theory; Comparison of Kennedy's and Lacey's theory.

WATER LOGGING AND CANAL LINING: Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – necessity, advantages and disadvantages; Types of lining; Design of lined canal.

UNIT – V

DIVERSION HEAD WORKS: Types of diversion head works; Diversion and Storage head works; weirs and barrages; Layouts of diversion head works; components; Causes and failure of hydraulic structures on pereable foundations; Blighs creep theory; Khoslastheory; Determination of uplift pressure, impervious floors using Blighs and Khoslas theory; Exit gradient.

CANALOUTLETS: Introduction; types of outlet; flexibility, proportionality, setting ,hyper proportional outlet, sub-proportional outlet, sensitivity, efficiency of an outlet, drowning ratio, modular limit; pipe outlet; kennedy's gauge outlet; gibb's module; canal escape.

TEXT BOOKS:

1. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:

1. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, Delhi
2. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
3. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.

Outcomes :

On completion of the course, the students will be able to:

1. To understand the basic types of irrigation, irrigation standards and crop water assessment
2. To study the different aspects of design of hydraulic structures

To provide knowledge on various hydraulic structures such as energy dissipaters, head and cross regulators, canal falls and structures involved in cross drainage works

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III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50104	**STRUCTURAL ANALYSIS – II**	2	2	-	3

OBJECTIVE: *Indeterminate structures are subjected to different loading with different supported conditions; hence it is necessary to study the behaviour of the structures.*

UNIT I

ARCHES : Three hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature- Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – (No analytical question).

UNIT-II

SLOPE-DEFLECTION & MOMENT DISTRIBUTION METHOD:-Analysis of single bay, single storey, portal frame including side sway– Stiffness and carry over factors – Distribution factors – Analysis of single storey portal frames – including Sway - Substitute frame analysis by two cycle method.

UNIT – III

KANI`S METHOD:-

Analysis of continuous beams – including settlement of supports and single bay, single storey portal frames with side sway by Kani's method.

UNI T – IV

FLEXIBILITY & STIFFNESS METHODS:-

Flexibility methods, Introduction, application to continuous beams including support settlements-Introduction to stiffness method and its application application to continuous beams including support settlements.

UNIT – V

PLASTIC ANALYSIS:

Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

TEXT BOOKS:

1. Analysis of structures by Vazrani & Ratwani – Khanna Publications.
2. Theory of structures by Ramamuratam, jain book depot , New Delhi.

REFERENCES :

1. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.
2. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.
3. Basic Structural Analysis by K.U.Muthu *et al.,* I.K.International Publishing House Pvt.Ltd

Outcomes:

On completion of the course, the students will be able to:

1. Apply the methods of indeterminate truss analysis
2. Demonstrate the behaviour of arches and their methods of analysis
3. Use various classical methods for analysis of indeterminate structures
4. Determine the effect of support settlements for indeterminate structures
5. Able to analyze the beam and frames for vertical and horizontal loads and draw SFD and BMD.
6. Able to calculate forces in members of truss due to load by stiffness method.

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III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50105	**ENGINEERING GEOLOGY**	3	-	-	3

OBJECTIVES: *The objectives of this is to give the basic knowledge of Geology that is required for construction of various Civil Engineering Structures. The syllabus includes the basics of Geology. Geological hazard's and gives a suitable picture on the Geological aspects that are to be considered for the planning and construction of major Civil Engineering projects.*

UNIT – I
INTRODUCTION:
Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.
WEATHERING OF ROCKS : Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like "Granite"
MINERALOGY :
Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartiz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT – II
PETROLOGY :
Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.
STRUCTURAL GEOLOGY :

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults un conformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT – III

GROUND WATER ,EARTH QUAKE &LAND SLIDES:-

Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT –IV

GEOPHYSICAL STUDIES:-

Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

UNIT – V

GEOLOGY OF DAMS ,RESERVOIRS AND TUNNELS :

Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor's Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

1) Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
2) Engineerring Geology by Vasudev Kanthi, Universities press, Hyderabad.

REFERENCES:

1. Engineerring geology by Prabin singh, Katson Pubilcations
2. Engineering geology by Duggal, TMH Publishers.
3. Engineering Geology by Subinoy Gangopadhyay, Oxford University press.
4. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications

Outcomes

1. The students would have the knowledge of principles of engineering geology.
2. The students would have the knowledge of properties of soil, various rocks and minerals
3. The students would be able to judge the suitability of sites for various civil engineering structures.
4. The students would exhibit the ability to use the knowledge of geological strata in the analysis and design the civil engineering structures.
5. The students would have the knowledge for deciding the suitability of water and soil conservation projects.

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III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50106	**BUILDING PLANNING AND DRAWING**	1	2	-	2

OBJECTIVE: *This subject provides the knowledge of building by laws, registration, planning of various types of buildings different sign convention of various Civil Engineering Materials, Doors, windows, tiles of roof, drawing of building plans etc.*

PART-A

UNIT -I

PLANING OF BUILDINGS: Types of buildings, types of residential buildings, site selection for residential building, orientation of buildings; aspect; prospect; privacy; furniture requirement;grouping;circulation;sanitation;lighting;ventilation;cleanliness;flexibility;elegancy ;Economy; practical considerations.

BUILDING BYELAWS AND REGULATIONS: Introduction- Terminology ;Objectives of building byelaws; Minimum plot sizes; Open space requirements ;Plinth area, floor area, carpet area; Floor area ratio (FAR), Floor space Index (FSI) ;areas for different units; Principles underlying building byelaws ; built up area limitations – Height of Buildings ,Wall thickness, lighting and ventilation requirement, safety from fire, drainage and sanitation; applicability of the bye-laws.

UNIT –II

PLANNING OF RESIDENTIAL BUILDINGS: Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings

PLANNING OF PUBLIC BUILDING: Planning of Educational institutions, Hospitals, Office buildings, Banks, Industrial buildings, Hotels and Motels, Hostels, Bus Station.

UNIT -III

BUILDINGS: SAFETY AND COMFORT: aspects of safety-structural, health, fire and constructional safety. Components of building automation system - HVAC, electrical lighting, Security, fire-fighting, communication etc. design for thermal comfort, ventilation comfort, air conditioning comfort, lighting comfort, noise and acoustic comfort.

PART-B

UNIT -IV

SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, and white lead etc.,

Earth, Rock, Timber and Marble. English bond & Flemish bond; odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

DOORS WINDOWS, VENTILATORS AND ROOFS: Paneled Door – paneled and glazed door; glazed windows – paneled windows; Swing ventilator – Fixed ventilator; Couple roof – Collar roof; Kind Post truss – Queen post truss.

UNIT –V

Given line diagram with specification to draw plan, section and elevation of:

1. Residential Building
2. Hospital
3. Schools
4. Post office
5. Corporate Office Building
6. Hotels
7. Bank buildings
8. Bus stations
9. Industrial buildings

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part- A and Part-B. Part- A consists of three questions with either or choice from three units in planning portion .Each question carries 10 marks. Total marks for Part-A is 30 marks. Part- B consists of two questions with either or choice from drawing portion. Question from unit-IV carries 10 marks and question from unit-V carries 30 marks. Total marks for Part-B is 40 marks.

TEXT BOOKS:

1. Planning and Designing and Scheduling – Gurucharan Singh and Jagadish Singh- Standard publishers.

2. Building Planning and Design – N.Kumara Swamy and A.Kameswara Rao. Charotar publications.

REFERENCE:

1. Building by laws by state and Central Governments and Municipal corporations. National Building Code

2. Building drawing with an integrated approach to building environment-M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc Graw Hill

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III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50107	**ENGINEERING GEOLOGY LAB**	-	1	3	2

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Inter pretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

Text Books:-

1. **Elementary Exercises in Geology by CVRK Prasad, Universities press.**

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III Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A50108	**CONCRETE TECHONOLOGY LAB**	-	1	3	2

1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.
5. Workability test on concrete by compaction factor, slump and Vee-bee.
6. Young's modulus and compressive strength of concrete.
7. Specific Gravity and Water Absorption of Coarse aggregate.
8. Bulking of Fine aggregate.
9. Non-Destructive testing on concrete (for demonstration)

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Vicat's apparatus
6. Specific gravity bottle.
7. Lechatlier's apparatus.
8. Slump and compaction factor setups
9. Longitudinal compressor meter and 1
10. Rebound hammer, Pulse velocity machine.
11. Relevant IS Codes

Reference books:-

1. Concrete Manual by M.L.Gambhir, Dhanpat Rai&co., Fourth edition.
2. Building construction and materials(Lab Manual) by Gambhir , TMH publishers.

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III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60101	**WATER RESOURCES ENGINEERING-II**	3	-	-	3

OBJECTIVE: *To study various head works canal structures and their design principles the subject also covers the river structures, their classifications, designs, etc.*

UNIT – 1

CANAL REGULATION WORKS: Canal falls: Necessity and location of falls; Types of falls; classification of falls; cistern design; roughening devices; design of sarada type fall. Canal regulators: off-take alignment; head regulators and cross-regulators; design of cross-regulator and distributary head regulator.

CROSS DRAINAGE WORKS: Introduction; types of cross drainage works; selection of suitable type of cross drainage work; classification of aqueducts and siphon aqueducts.

UNIT-II

STREAM GAUGING: Necessity; Selection of gauging sites; methods of DischargeMeasurementArea-Velocity method; Slope-Area method; Tracer method, Electromagnetic induction method,Ultrasonic method; Measurement of depth –Sounding rod, Echo-sounder; Measurement ofvelocity: Floats – Surface floats, Sub–surface float or Double float, Velocity rod; Pitot tube;Current meter- rating of current meter, measurement of velocity; chemical method; Measurementof stage-Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage-dischargecurve.

RIVER ENGINEERING: Classification of rivers; Meandering; Causes of meandering; Basic factors controlling process of meandering; Aggrading type of river; Degrading type of River; River training: objectives, Classification of river training works; Types of River training works : Guide banks, Marginal embankments ,Groynes or spur, levees, bank protection, pitched islands.

UNIT-III

RESERVOIR PLANNING: Introduction; Investigations for reservoir planning; Selection ofsitefor a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curveand demand curve; Calculation of reservoir capacity for a specified yield from the mass inflowcurve; Determination of safe yield from a reservoir of a given capacity; Sediment flow instreams:Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Flood routing;Methodsof flood routing-Graphical Method (Inflow – storage discharge curves method).

DAMS :GENERAL: Introduction; Classification according to use; classification according to material- Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams-advantages and disadvantages; Physical factors governing selection of type of dam ; selection of site for a dam.

UNIT-IV

GRAVITY DAMS: Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure: stability requirements; principal and shear stresses; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam- High and low gravity dams; Design of gravity dams–single step method; Galleries; Stability analysis of non–overflow section of Gravity dam.

EARTH DAMS: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures; Slope protection. Seepage through earth dam – graphical method

UNIT-V

SPILLWAYS: Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons; Spillway crest gates-Types and description only.

WATER POWER ENGINEERING: Development of hydro power in India; Classification of hydel plants: runoff river plants, storage plants and pumped storage plants; low, medium and high head schemes ; Investigation and planning; components of hydel schemes – fore bay, intake structure, surge tanks, penstocks ,power house, turbines-selection of suitable type of turbine, Scroll casing .draft tube and tail race; assessment of available power; definition of gross head ,operating head ,effective head; Flow duration curve; Power duration curve; Load duration curve; Load curve ; primary power and secondary power; installed capacity, dependable capacity; firm power, secondary power; power factor ;load factor, capacity factor ,utilization factor and Diversity factor.

TEXT BOOKS:

3. Irrigation and Water Power Engineering by Dr. B.C.Punmia & Dr. Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi.
4. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Irrigation, Waterpower and Water Resources Engineering by K R Arora; Standard Publication,New Delhi.
3. Water resources engineering by Satyanarayana Murthy. Challa, New Age International Publishers

outcomes:

On completion of the course, the students will be able to:

1. Design various channel systems
2. Design head and cross regulator structures
3. Identify various types of reservoir and their design aspects
4. By the Establishes the understanding of cross drainage works and its design
5. Design different types of dams
6. Design gravity dam and earthen dam
7. Design the canal systems

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III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60102	**DESIGN OF REINFORCED CONCRETE STRUCTURES**	3	2	-	4

OBJECTIVE: *Structural elements are subjected to different loading to with stand the structures, for external loading we need to design the structures for its safety and serviceability.*

UNIT –I

Concepts of RC. Design –Introduction to Working stress method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS: 456 – 2000.

Beams **:** Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – II

Shear, Torsion and Bond **:** Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing

Limit state design for serviceability for deflection, cracking and codal provision.

UNIT - III

Design of Two-way slabs, one way slab, continuous slab Using I S Coefficients, Cantilever slab /Canopy slab.

UNIT –IV

Short and Long columns –axial loads, uni axial and biaxial bending I S Code provisions.

UNIT – V

Design of Footings - isolated (square, rectangular) and Combined footings.

Design of Stair case – Dog legged and Open well.

NOTE : All the designs to be taught in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, Two way and continuous slabs

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS:

1. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishres, New Delhi

REFERENCES :

4. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad
5. Analysis of skeletal structures by seetharamulu kaveti, TMH pubilications.
6. Limit state designed of reinforced concrete – P.C.Varghese, Printice Hall of India, New Delhi

Codes/Tables: IS 456-2000 and IS-800 code books to be permitted into the examinations Hall.

Outcome:

After completing the course, the student should be able to do the following:

1. Will be able to understand the basic concepts of reinforced concrete analysis and design.
2. Will be able to understand the behavior and various modes of failure of reinforced concrete members.
3. Will be able to analyze and design various reinforced concrete members.
4. Will be able to understand and analyze the effect of various support conditions on design of structures.
5. Will be able to implement the knowledge in using analysis and design softwares.

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III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60103	**GEOTECHNICAL ENGINEERING – I**	2	2	-	3

OBJECTIVE: *The object of this course is to make the student to understand the behaviour of soil under different loads and different conditions. This is necessary because the safety of any structure depends on soil on which it is going to be constructed.*

UNIT – I
INTRODUCTION: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship – Relative density.
INDEX PROPERTIES OF SOILS: Moisture Content, Specific Gravity, Insitu density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

UNIT –II
PERMEABILITY: Soil water – capillary rise – flow of water through soils – Darcy's law-permeability – Factors affecting – laboratory determination of coefficient of permeability – Permeability of layered systems.
SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

UNIT – III
STRESS DISTRIBUTION IN SOILS: Boussinesq's and Wester gaard's theories for point loads and areas of different shapes – Newmark's influence chart .
COMPACTION: Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment – compaction control.

UNIT – IV
CONSOLIDATION : Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil and under consolidated soil - preconsolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement..

UNIT – V
SHEAR STRENGTH OF SOILS : Importance of shear strength **–** Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio – Liquefaction- shear strength of clays.

TEXT BOOKS:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

REFERENCES:

1. Soil Mechanics and Foundation by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. Geotechnical Engineering by Iqbal H.Khan, PHI pubilishers.
3. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi.

OUTCOMES:

On completion of the course, the students will be able to:

1. carry out soil classification
2. solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram
3. estimate the stresses under any system of foundation loads
4. solve practical problems related to consolidation settlement and time rate of settlement

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Subject Code	Title of the Subject	L	T	P	C
17A60104	**ESTIMATION, COSTING AND VALUATION**	2	2	-	3

OBJECTIVE: *The objective of the course is to make the student to understand about estimation and valuations of different types of structures and their valuation as per standard schedule of rates.*

UNIT – I
INTRODUCTION : General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.
STANDARDS SPECIFICATIONS : Standard specifications for different items of building construction

UNIT – II
ESTIMATION OF BUILDINGS : Detailed Estimates of Buildings

UNIT – III
EARTHWORK ESTIMATION : Earthwork for roads and canals.
REINFORCEMENT ESTIMATION : Reinforcement bar bending and bar requirement schedules.

UNIT – IV
CONTRACTS AND TENDERS : Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering.

UNIT – V
RATE ANALYSIS : Working out data for various items of work over head and contigent charges.
VALUATION : Valuation of buildings.

TEXT BOOKS
1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Contracts and estimations by B.S.Patil, Universities.Press, Hyderabad.

REFERENCES :
1. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
2. Engineering construction cost by Peurifoy , TMH Publishers.
3. Standard Schedule of rates and standard data book by public works department.
4. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)

Note : Standards scheduled of rates is permitted in the examination hall.

Outcomes :
On completion of the course, the students will be able to:

1. apply different types of estimates in different situations
2. carry out analysis of rates and bill preparation at different locations
3. demonstrate the concepts of specification writing
4. carry out valuation of assets

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Subject Code	Title of the Subject	L	T	P	C
17A60105	**ENVIRONMENTAL ENGINEERING (OPEN ELECTIVE -I)**	3	-	-	3

OBJECTIVE: *This subject provides the knowledge of water sources, water treatment, design of distribution system waste water treatment, and safe disposal methods. The topics of characteristics of waste water, sludge digestion are also included.*

UNIT – I

INTRODUCTION: Importance and Necessity of Protected Water Supply systems, Objectives of Protected water supply system, Flow chart of public water supply system, Role of Environmental Engineer.

WATER DEMAND AND QUANTITY STUDIES : Estimation of water demand for a town or city, Types of water demands, Per capita Demand, Factors affecting the Per Capita Demand, Variations in the Demand, Design Period, Factors affecting the Design period, Population Studies, Population Forecasting Studies.

QUALITY AND ANALYSIS OF WATER: Characteristics of water – Physical, Chemical and Biological. Analysis of Water – Physical, Chemical and Biological. Impurities in water, Water borne diseases. Drinking water quality standards.

UNIT - II

WATER TREATMENT: Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants – feeding arrangements. Filtration and Chlorination**:** Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, other disinfection practices- Miscellaneous treatment methods

WATER DISTRIBUTION : Distribution systems – Requirements, Layout of Water distribution systems - Design procedures- Hardy Cross and equivalent pipe methods service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house, waste detection and prevention.

UNIT – III

INTRODUCTION TO SANITATION :systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage – classification of sewerage systems- Estimation of sewage flow and storm water drainage – fluctuations – types of sewers – Hydraulics of sewers and storm drains– design of sewers – materials for sewers- appurtenances in sewerage – cleaning and ventilation of sewers .

WASTE WATER COLLECTION AND CHARACTERSTICS : Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow – characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. – C.O.D. equations.

UNIT IV

WASTE WATER TREATMENT: Layout and general out line of various units in a waste water treatment plant – primary treatment: design of screens – grit chambers – skimming tanks

– sedimentation tanks – principles of design – biological treatment – trickling filters – standard and high rate – Construction and design of Oxidation ponds.

SLUDGE TREATMENT: Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks and Imhoff Tanks, working principles and design – soak pits.

UNIT – V

SOLID WATE MANAGEMENT: Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

AIR POLLUTION: Types of pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

NOISE POLLUTION: Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

TEXT BOOKS:

1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.
2. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi
3. Environmental Engineering by Peavy, TMH Publishers.

REFERENCS :

1. Environmental Science and Engineering by J.G.Henry and G.W.Heinke – Person Education..
2. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
3. Elements of environmental engineering by K.N. Duggal, S. Chand Publishers.

OUTCOMES:

On completion of the course, the students will be able to:

1. Identify the source of water and water demand
2. Apply the water treatment concept and methods
3. Apply water distribution processes and operation and maintenance of water supply
4. Prepare basic process designs of water and wastewater treatment plants collect, reduce, analyze, and evaluate basic water quality data
5. Determine the sewage characteristics and design various sewage treatment plants
6. Carry out municipal water and wastewater treatment system design and operation
7. Apply environmental treatment technologies and design processes

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III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60105	**INTELLECTUAL PROPERTY RIGHTS (OPEN ELECTIVE - I)**	3	-	-	3

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks : Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents : Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets : Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition : Misappropriation right of publicity, False advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law ; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah. E. Bouchoux, cengage learing.
2. Intellectual property right – nleashmy the knowledge economy, prabuddha ganguli, Tate Mc Graw Hill Publishing company ltd.,

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Subject Code	Title of the Subject	L	T	P	C
17A60105	**INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT (OPEN ELECTIVE)**	3	-	-	3

Objectives:

- To familiarize student with the knowledge of theory and design of Industrial waste water treatment.
- To produce civil engineering graduates who have strong fundamental knowledge about the treatment of effluents from food and chemical industries.

UNIT – I:

Quality requirements of boiler and cooling waters - Quality requirements of process water for Textile - Food processing and Brewery Industries - Special Treatment processes.

UNIT – II:

Basic Theories of Industrial Waste water Management - Volume reduction - Strength reduction - Neutralization - Equalization and proportioning. Joint treatment of industrial wastes and domestic sewage - consequent problems.

UNIT –III:

Industrial wastewater discharges into streams. Lakes and oceans and problems.

UNIT – IV:

Recirculation of Industrial Wastes - Use of Municipal Waste Water in Industries. .

UNIT – V:

Industrial Wastes - Special characteristics & Treatment of Liquid Wastes from the following industries: Textile, Tannery, Paper and Pulp, Distilleries, Dairy, Fertilizer Plant, Sugar Mill, Steel plants, oil Refineries -Pharmaceutical plants - thermal power plants.

TEXT BOOKS:

1. Waste Water Treatment by Rao and Dutta. IBH Publishers
2. Metcalf and Eddy. “Waste water Engineering – Collection, Treatment, Disposal and Reuse”, Mc Graw Hill Pub. Co., 1995.
3. Water and Waste Water technology by Mark J. Hammer and Mark J. Hammer (Jr)

Course Outcomes:

- Student will be able to identify and analyse the waste from various sources.
- Student will be able to understand about Industrial processes –Origin of waste water – various treatment methods, code of practices – management.

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III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A65501	**ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB**	-	1	3	2

1. Introduction:

In the past engineering education has focused only on imparting "hard" or technical skills. With the entry of multinational companies in India there is a revolutionary change in the employment opportunities and recruitment process as well. Globalization demands universities to produce engineers who are equipped with effective interpersonal skills to meet global demands.

In this scenario the **Advanced English Language Communication skills lab** introduced at the 3rd B. Tech. level plays a key role to learn the foreign language in a happy atmosphere and in a successful way. Breaking through the traditional method of teaching, this course motivates student's learning attitude by providing an interactive learning environment.

This course is developed on the methodology of LSRW skills along with soft skills. This course focuses on the practical aspects of listening, speaking, reading and writing that enable the students to expose to various activities like group discussions, Oral Presentations, Mock interview sessions etc., Personality development, etiquettes and to provide corporate knowledge to help the students in facing interviews in a formal organizational set up.

2. Objectives:

This lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

- To expose the students to a variety of self instructional, learner-friendly modes of language learning.
- To enable the students to learn better pronunciation and accent through listening and reading exercises.
- To train students to use language appropriately for interviews, group discussion and public speaking.
- To initiate them to greater use of the computer in resume preparation, format-making etc.
- To help the students to cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer based competitive exams such as GRE, TOFEL, and GMAT etc.

- To enable the students to acquire good communication skills as well as soft skills to meet global demands.

3 **Syllabus:**

The following course content is prescribed for the Advanced Communication Skills Lab:

Unit I:

Reading &Listening Comprehension: Skimming –scanning- Extensive and Intensive reading. Reading for making inferences. Active VS passive listening. Listening and Note taking, - Listening for making inferences.

. **Unit II:**

Writing Skills: Formal and informal writing- Resume Writing-E-Correspondence.

. **Unit III:**

Technical Presentations (Oral) : Planning-Preparation-Presentation . Art of Persuasion- Audience analysis- Handling questions.

Unit IV:

Interview Skills: Types of Interviews - pre-interview planning- answering strategies. Analysis of One to one –interviews – group interviews - Mock interviews.

Unit V:

Soft Skills: Inter Personal Skills- Goal setting – Etiquettes and good manners – Team Working – Work Ethics--Time management – Problem Solving.

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Minimum Requirements

The English Language Lab shall have two parts:

The Computer Aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.

The Communication Skills Lab with movable chairs and audio-visual aids with a PA System, a TV, a digital stereo-audio and video system, a Camcorder, etc

System Requirement (Hardware Component):

Computer network with LAN with a minimum of 60 multimedia systems with the following specifications:

P-IV Processor
Speed-2.8 GHZ
RAM_512 MB minimum
Hard Disk-80 GB
Headphones

Prescribed Software:

10. K-Van Advanced Communication Skills
11. Walden Infotech Advanced Communication Skills.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. **Technical Writing and Professional Communication, Huckin and Olsen** Tata Mc Graw-Hil 2009.

2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.

3. **Cambridge English for Job-Hunting** by Colm Downes, Cambridge University Press, 2008

4. **Resume's and Interviews** by M.Ashraf Rizvi, Tata Mc Graw-Hill, 2008

5.. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.

6. **Managing Soft Skills** by K R Lakshminarayan and T.Muruguvel, Sci-Tech Publications, 2010

7. The ACE of Soft Skills by Gopal Ramesh and Mahadevan Ramesh, Pearson Education, 2010

8. **Soft Skills** by Dr. K. Alex, S.Chand

9. **Study Skills for Professional Students in Higher Education** by Dr. M. Adithan, S.Chand.

10. **Personality Development and Soft Skills by Barun** K. Mitra, Oxford Higher Education.

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III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60106	**ENVIRONMENTAL ENGINEERING LAB**	-	1	3	2

OBJECTIVE: *The laboratory provides knowledge of estimating various parameters like PH, Chlorides, Sulphates, Nitrates in water. For effective water treatment, the determination of optimum dosage of coagulant and chloride demand are also included. The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.*

LIST OF EXPERIMENTS

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coliform test.

NOTE: At least 8 of the above experiments are to be conducted.

LIST OF EQUIPMENT

1) pH meter,
2) Turbidity meter,
3) Conductivity meter,
4) Hot air oven,
5) Muffle furnace,
6) Dissolved Oxygen meter,
7) U – V visible spectrophotometer,
8) Reflux Apparatus,
9) Jar Test Apparatus,
10) BOD incubator.
11) COD Extraction apparatus

TEXT BOOKS:

1. Chemistry for Environmental Engineering by Sawyer and Mc. Carty
2. Standard Methods for Analysis of water and Waste Water – APHA
3. Environmental Engineering Lab Manual by Dr.G.Kotaiah and Dr.N.Kumara Swamy, Charotar Publishers, Anand.

REFERENCE

1. Relevant IS Codes.

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III Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A60107	**GEOTECHNICAL ENGINEERING LAB**	-	1	3	2

OBJECTIVE: *To obtain the properties of soils by conducting experiments, it is necessary for students to understand the behavior of soil under various loads and conditions.*

LIST OF EXPERIMENTS

1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant and variable head test
5. Compaction test
6. CBR Test
7. Consolidation test
8. Unconfined compression test
9. Tri-axial Compression test
10. Direct shear test.
11. Vane shear test

Any eight experiments may be completed.

LIST OF EQUIPMENT:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and Shrinkage limits
3. Field Density apparatus for
    a) Core cutter method
    b) Sand Replacement method

4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 5.15mm, and 0.075mm.
6. Hydrometer
7. Permeability Apparatus for
    a) Constant Head test
    b) Variable Head test
8. Universal Auto compactor for I.S light and heavy compaction tests.
9. Apparatus for CBR test
10. Sampling tubes and sample extractors.
11. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
12. One dimensional consolation test apparatus with all accessories.
13. Tri-axial cell with provision for accommodating 38 mm dia specimens.
14. Box shear test apparatus
15. Laboratory vane shear apparatus.
16. Hot Air ovens (Range of Temperature 50-150^{0}C
17. Moisture cans – 2 dozens.

18. Electronic balances pf 500 g capacity with 0.01g least count and 5 kg capacity with least count of 1gm
19. Measuring Jars - 1000CC- 6
    - 100CC- 4
20. Mercury - 500 g
21. Rammers - 2
    Crow bars - 2

TEXT BOOKS:

1.Soil Testing Lab Manual by K.V.S. Appa Rao & V.C.C.Rao,University Science Press , Laxmi Publication.
2.Soil Testing for Engineers by S.Mittal and J.P.Shukla, Kahna Publishers, New Delhi.
3. Relevant IS Codes.

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IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70101	**FINITE ELEMENT ANALYSIS**	2	2	-	3

OBJECTIVE: *To familiarize the student with the latest developments in analysis for Civil Engineering problems.*

UNIT –I

INTRODUCTION: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

PRINCIPLES OF ELASTICITY: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT –II

ONE DIMENSIONAL & TWO DIMENSIONAL ELEMENTS: Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems .Two Dimensional Elements - Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

UNIT –III

GENERATION OF ELEMENT : Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements.

UNIT –IV

ISOPARAMETRIC FORMULATION :

Concepts of, isoparametric elements for 2D analysis –formulation of CST element, 4 –Noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.

AXI-SYMMETRIC ANALYSIS: Basic principles-Formulation of 4-noded iso-parametric axi-symmetric element

UNIT-V

SOLUTION TECHNIQUES: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOK:

1. Finite Element Analysis for Engineering and Technology, Tirupathi R Chandraputla, Universities Press Pvt Ltd, Hyderabad. 2003.
2. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers

REFERENCES:

1. Finite element analysis and procedures in engineering by H.V.Lakshminaryana, 3rd edition, universities press, Hyderabad.
2. 3.. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, New Delhi.
3. Finite element analysis by S.S. Bhavakatti-New age international publishers

OUTCOMES**:**

On completion of the course, the students will be able to:

1. demonstrate the differential equilibrium equations and their relationship
2. apply numerical methods to FEM
3. demonstrate the displacement models and load vectors
4. compute the stiffness matrix for isoperimetric elements
5. analyze plane stress and plane strain problems

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IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70102	**GEOTECHNICAL ENGINEERING – II**	2	2	-	3

Objective: *To use the principles of Soil mechanics to design the foundations, Earth retaining structures and slope stability safely and economically knowledge of the subject is essential.*

UNIT – I

SOIL EXPLORATION: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report.

UNIT – II

EARTH SLOPE STABILITY: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

UNIT – III

EARTH PRESSURE THEORIES: Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Rebhann's and Culmann's graphical method

RETAINING WALLS: Types of retaining walls – stability of retaining walls.

UNIT – IV

SHALLOW FOUNDATIONS: Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff's and Skempton`s Methods

ALLOWABLE BEARING PRESSURE : Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures – Settlement Analysis

UNIT –V

PILE FOUNDATION: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

WELL FOUNDATIONS: Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts.

TEXT BOOKS:

1. Geotechnical Engineering by C.Venkataramaiah, New Age Pubilications.
2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi
3. Soil Mechanics and Foundations by – by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCES:

1. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
2. Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson Engineering
3. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
4. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
5. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.

6. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

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IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70103	**TRANSPORTATION ENGINEERING – I**	3	-	-	3

OBJECTIVE: *It deal with different components of Transportation Engineering like highway, Railway & Airport Engineering. Emphasis is a Geometric Design of different elements in Transportation Engineering.*

UNIT I

HIGHWAY DEVELOPMENT AND PLANNING:

Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II

HIGHWAY GEOMETRIC DESIGN:

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT – III

TRAFFIC ENGINEERING:

Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation – Highway capacity and level of service concept – factors affecting capacity and level of service - Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams.

TRAFFIC REGULATION AND MANAGEMENT:

Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Specifications - Design of Traffic Signals –Webster Method – Saturation flow – phasing and timing diagrams – Numerical problems.

UNIT – IV

INTERSECTION DESIGN:

Conflicts at Intersections- Channelisation: Objectives –Traffic Islands and Design criteria-Types of At-Grade Intersections – Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT – V

PAVEMENT DESIGN :

Types of pavements – Difference between flexible and rigid pavements – Pavement Components – Sub grade, Sub base, base and wearing course – Functions of pavement components – Design Factors – Flexible pavement Design methods – G.I method, CBR

Method, (as per IRC 37-2002) –Design of Rigid pavements – Critical load positions - Westergaard's stress equations – computing Radius of Relative stiffness and equivalent radius of resisting section – stresses in rigid pavements – Design of Expansion and contraction joints in CC pavements. Design of Dowel bars and Tie bars.

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Traffic Engineering and Transportation planning by L.R.Kadiyali and Lal- Khanna Publications.

REFERENCES:

1. Principles and Practice of Highway Engineering Design – L.R.Kadiyali and Lal-Khanna Publications.
2. Text book of Highway Engineering by R.Srinivasa Kumar, Universities Press, Hyderabad.
3. Highway Engineering – Dr.S.K.Sharma, S.Chand Publishers

Outcomes :

On completion of the course, the students will be able to:

1. carry out surveys involved in planning and highway alignment
2. design cross section elements, sight distance, horizontal and vertical alignment
3. implement traffic studies, traffic regulations and control, and intersection design
4. determine the characteristics of pavement materials
5. design flexible and rigid pavements as per IRC

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COLLEGE OF ENGINEERING:: ANANTAPUR

IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70104	**EXPERIMENTAL STRESS ANALYSIS (OPEN ELECTIVE - II)**	3	-	-	3

Objective:-
To bring awareness on experimental method of finding the response of the structure to different types of load.

1. **PRINCIPLES OF EXPERIMENTAL APPROACH :-**
   Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods –Simplification of problems.
2. **STRAIN MEASUREMENT USING STRAIN GAUGES :-**
   Definition of strain and its relation of experimental Determinations Properties of Strain-Gauge Systems-Types of Strain Gauges –Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – various types –Gauge factor – Materials of adhesion base..
3. **STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE:-**
   Introduction – the three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge.
   Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.
4. **THEORY OF PHOTOELASTICITY** :-
   Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster's Stress Optic law.
5. **TWO DIMENSIONAL PHOTOELASTICITY :-**
   Introduction – Isochramic Fringe patterns- Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

Reference Books :-

1.Experimental stress analysis by J.W.Dally and W.F.Riley, College House Enterprises
2. Experimental stress analysis by Dr.Sadhu Singh.khanna Publishers
3.Experimental Stress analysis by U.C.Jindal, Pearson Pubilications.
4. Experimental Stress Analysis by L.S.Srinath, MC.Graw Hill Company Publishers.

OUTCOMES:
After completion of the course

1. **The student** will be able to understand different methods of experimental stress analysis

2. **The student** will be able to understand the use of strain gauges for measurement of strain
3. **The student** will be exposed to different Non destructive methods of concrete
4. **The student** will be able to understand the theory of photo elasticity and its applications in analysis of structures

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IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70104	**ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT (OPEN ELECTIVE – II)**	3	-	-	3

Objective:-

This course is aimed at exposing the student to the concept of environmental impact assessment and methodologies used for the same. The student will also be imparted the knowledge about the various laws related to EIA and also methods of EIA audit.

UNIT – I

INTRODUCTION:-

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT – II

EIA METHODOLOGIES:-

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT – III

IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:-

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT – IV

ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE :

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

ENVIRONEMNTAL AUDIT :

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT-V

ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION)

Post Audit activities, The Environmental protection Act, The water preventation Act, The Air (Prevention & Control of pollution Act.), Wild life Act.Case studies and preparation of Environmental Impact assessment statement for various Industries.

TEXT BOOKS:

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

REFERENCES:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari & Sons Publication., New Delhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

Outcomes :-

After completion of this course the student will be able to

1. Understand the concept of Environmental impact
2. Understand the methodologies related to EIA
3. Appreciate various laws related to environmental protection
4. Prepare the environmental impact assessment statement and to evaluate it.

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IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70104	**DISASTER MANAGEMENT AND MITIGATION (OPEN ELECTIVE – II)**	3	-	-	3

Objective:-The objectives of this is to give the basic knowledge of Environmental Hazards and disasters. The syllabus includes the basics of Endogenous and Exogenous hazard's and gives a suitable picture on the different types of hazardas.

Unit-I

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

Unit –II

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards –

Unit–III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

Unit –IV

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters

Infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes , distribution human adjustment, perception & mitigation)Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves.Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation).Droughts:- Impacts of

droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion

Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion.Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes.Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation.Biological hazards/ disasters:- Population Explosion.

Unit –V

Emerging approaches in Disaster Management- Three Stages
1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

Text books:

1. Disaster Management by Rajib Shah, Universities Press, India, 2003
2. Disaster Mitigation: Experiences And Reflections by Pardeep Sahni
3. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning

References

1.Kates,B.I & White, G.F The Environment as Hazards, oxford, New York, 1978

2.R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000

3.H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003

4.R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo,1994

5.Dr. Satender , Disaster Management t in Hills, Concept Publishing Co., New Delhi, 2003

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IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70105	**BRIDGE ENGINEERING (Elective – I)**	3	-	-	3

OBJECTIVE: *It deal with different types of Bridges like deck slab bridge, T – Beam Bridge e.t.c and gives a god knowledge on different components of bridges.*

UNIT - I

INTRODUCTION:

Importance of site investigation in Bridge design. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.

BOX CULVERT : General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.

BRIDGE BEARINGS :

General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.

UNIT - II

DECK SLAB BRIDGE :

Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only.

UNIT - III

BEAM & SLAB BRIDGE (T-BEAM BRIDGE)

General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

UNIT – IV

PLATE GIRDER BRIDGE :

Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.

COMPOSITE BRIDGES :

Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders' including shear connectors

UNIT V

PIERS & ABUTMENTS:

General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design).

TEXT BOOKS :

1. Bridge Engineering by Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi.
2. Design of Bridges by N.Krishnam Raju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.

3. Relevant – IRC & Railway bridge Codes.

REFERENCE :-

1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Design of Bridges Structure by D.J.Victor
3. Design of Steel structures by Ramachandra.
4. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
5. Design of Bridges Structure by T.R.Jagadish & M.A.Jayaram Prentice Hall of India Pvt., Delhi.

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IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70105	**GROUND IMPROVEMENT TECHNIQUES (Elective – I)**	3	-	-	3

Objective :- The knowledge on the problems posed by the problematic soils and the remedies to build the various structures in problematic soils.

UNIT – I

DEWATERING: Methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis .

GROUTING: Objectives of grouting- grouts and their properties- grouting methods- ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- post grout test.

UNIT – II

DENSIFICATION METHODS IN GRANULAR SOILS:-

In – situ densification methods in granular Soils:– Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth.

DENSIFICATION METHODS IN COHESIVE SOILS:–

In – situ densification methods in Cohesive soils:– preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

UNIT – III

STABILISATION: Methods of stabilization-mechanical-cement- lime-bituminous-chemical stabilization with calcium chloride,sodium silicate and gypsum

UNIT – IV

REINFORCED EARTH: Principles – Components of reinforced earth – factors governing design of reinforced earth walls – design principles of reinforced earth walls.

GEOSYNTHETICS : Geotextiles- Types, Functions and applications – geogrids and geomembranes – functions and applications.

UNIT - V

EXPANSIVE SOILS: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.

TEXT BOOKS:

1. Haussmann M.R. (1990), Engineering Principles of Ground Modification, McGraw-Hill International Edition.
2. Dr.P.Purushotham Raj. Ground Improvement Techniques, Laxmi Publications, New Delhi / University science press, New Delhi
3. Nihar Ranajan Patra. Ground Improvement Techniques, Vikas Publications, New Delhi

REFERENCES:

1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons,
   New York, USA.

3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercy, USA

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IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70105	**Cost Effective Housing Techniques (Elective – I)**	3	-	-	3

UNIT-I: a) **Housing Scenario**

Introducing - Status of urban housing - Status of Rural Housing

b) Housing Finance:

Introducing - Existing finance system in India - Government role as facilitator - Status at Rural Housing Finance - Impedimently in housing finance and related issues

a**) Land use and physical planning for housing**

introduction - Planning of urban land - Urban land ceiling and regulation act - Efficiency of building bye lass - Residential Densities

b) Housing the urban poor

Introduction - Living conditions in slums - Approaches and strategies for housing urban poor

UNIT-II: Development and adoption of low cost housing technology

Introduction - Adoption of innovative cost effective construction techniques - Adoption of precast elements in partial prefatroices - Adopting of total prefactcation of mass housing in India- General remarks on pre cast rooting/flooring systems -Economical wall system - Single Brick thick loading bearing wall - 19cm thick load bearing masonery walls - Half brick thick load bearing wall - Flyash grypsym thick for masonry - Stone Block masonery - Adoption of precast R.C. plank and join system for roof/floor in the building

UNIT-III: Alternative building materials for low cost housing

Introduction - Substitute for scarce materials – Ferrocement - Gypsum boards - Timber substitutions - Industrial wastes - Agricultural wastes - Fitire starateru; for ,p,topm of alternative building maintenance

Low cost Infrastructure services:

Introduce - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy

UNIT-IV: Rural Housing:

Introduction traditional practice of rural housing continuous - Mud Housing technology Mud roofs - Characteristics of mud - Fire treatment for thatch roof - Soil stabilization - Rural Housing programs

UNIT-V: Housing in Disaster prone areas:

Introduction – Earthquake - Damages to houses - Traditional prone areas - Type of Damages and Railways of non-engineered buildings - Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions. Requirement's of structural safety of thin precost roofing units against Earthquake forcesStatus of R& D in earthquake strengthening measures - Floods, cyclone, future safety

TEXT BOOKS

1. Building materials for low –income houses – International council for building research studies and documentation.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Properties of concrete – Neville A.m. Pitman Publishing Limited, London.
4. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963.
5. Low cost Housing – G.C. Mathur.
6. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G.Annamalai.

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IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70106	DESIGN STUDIO LAB	-	1	3	2

CAD:

SOFTWARE:

1. STAAD PRO or Equivalent

EXCERCISIES:

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. Column Analysis & Design

TEXT BOOK:

1.Computer Aided Design Lab Manual by Dr.M.N.Sesha Prakash And Dr.C.S.Suresh

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IV Year B.Tech (Civil Engineering) – I Semester

Subject Code	Title of the Subject	L	T	P	C
17A70107	**HIGHWAY MATERIALS LAB**	-	1	3	2

I. ROAD AGGREGATES:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS :

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Length and elongation gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Penskey – Morten's apparatus
11. Relevant IS Codes

TEXT BOOKS:-

1. Lab manual in High way Engineering by Ajay.K.Duggal & Vijay .P.Puri, New Age pubilications,New Delhi

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IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80101	**ADVANCED STRUCTURAL ENGINEERING (ELECTIVE-II)**	3	-	-	3

OBJECTIVE: *To make the student more conversant with the design principals of multistoried buildings, roof system, foundation and other important structures.*

1. Design of a flat slab(Interior panel only)
2. Design of concrete bunkers of circular shape – (excluding staging) – Introduction to silos
3. Design of concrete chimney
4. Design of circular and rectangular water tank resting on the ground
5. Design of cantilever and counter forte retaining wall with horizontal back fill

FINAL EXAMINATION PATTERN:

The question paper shall contain 2 questions of either or type covering all the syllabus where each question carries 35 marks out of 35 marks, 20 marks shall be for the design and 15 marks are for the drawing.

TEXT BOOKS :-

1. Structural Design and drawing (RCC and steel) by Krishnam Raju, Universites .Press , New Delhi
3. R.C.C Structures by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi
4. Advanced RCC by Varghese , PHI Publications, New Delhi.
5. Design of RCC structures by M.L.Gambhir P.H.I. Publications, New Delhi.

Reference books :-

1. R.C.C Designs by Sushil kumar , standard publishing house.
2. Fundamentals of RCC by N.C.Sinha and S.K.Roy, S.Chand Publications, New Delhi.

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IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80101	**BUILDING CONSTRUCTION MANGEMENT (ELECTIVE-II)**	3	-	-	3

Objective: The objective of the course is to make the student to understand about fundamentals of construction management and techniques to be used to perform and complete the construction works intime by saving time and money.

UNIT - I

FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY :

Definitions and Discussion – Construction Activities – Construction Processes - Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations.

PREPARATORY WORK AND IMPLEMENTATION

Site layout – Infrastructure Development – Construction Methods – Construction Materials – Deployment of Construction Equipment – Prefabrication in Construction – Falsework and Temporary Works.

UNIT - II

EARTHWORK :

Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging.Rock Excavation – Basic Mechanics of Breakage – Blasting Theory – Drillability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting.

UNIT - III

PROJECT MANAGEMENT AND BAR CHARTS AND MILESTONE CHARTS :

Introduction – Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT net work problems.

UNIT - IV

ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK :

Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems – Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure –Hierarchies – Illustrative examples – Problems.

UNIT - V

PERT AND CPM: TIME COMPUTATIONS & NETWORK ANALYSIS

Introduction – Uncertainties : Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time Problems -Earliest expected time – Formulation for T_E - Latest allowable occurrence time – Formulation for T_L - Combined tabular computations for T_E and T_L problems.Introduction - Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems – CPM : process – CPM : Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for T_E and T_L - Start and f inish times of activity – Float – Critical activities and critical path – Illustrative examples Problems.

TEXT BOOKS :

1. Construction project management by Jha ,Pearson pubilications,New Delhi.
2. Construction Technology by Subir K.Sarkar and Subhajit Saraswati – Oxford Higher Education- Univ.Press, Delhi.
3. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi.

REFERENCES:

1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
2. Total Project management, the Indian context- by : P.K.JOY- Mac Millan Publishers India Limited.

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IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80101	**WATER HARVESTING AND CONSERVATION (ELECTIVE-II)**	3	-	-	3

OBJECTIVE:

The main aim of this course is to discuss various aspects of water resources development and management on watershed basis. The various sections in the course will focus on the technical aspects of watershed management; perspectives on water management; skills of analyzing the complex issues in water management and on specific knowledge on issues of watershed management.

Unit – I

Water Harvesting: Principles of water harvesting-methods of rainwater harvesting-design of rainwater harvesting structures-Purification Techniques for direct use- Harvesting of surface runoff-onsite detention basin - ponds - types - Recycling of harvested water

Unit – II

Water Recovery and Reuse: Perspective on recycle and reuse- factors affecting the development of water reclamation and reuse criteria- elements/components of water reclamation and reuse criteria / guidelines- sewage irrigation- Waste water reclamation-waste water recharge for reuse – Treatment Requirements for Water Reuse-methods

Unit – III

Sustainable Watershed Approach & Watershed Management Practices: Concept of watershed-Introduction to watershed management- Integrated water resources management- natural resources management-agricultural practices-integrated farming-Conjunctive use of water resources-Community participation-Watershed Management Practices in Arid and Semiarid Regions-Case studies-Short term and long term strategic planning.

Unit – IV

Watershed Modeling: Standard modeling approaches and classifications, system concept for watershed modeling, overall description of different hydrologic processes, modeling of rainfall-runoff process, subsurface flows and groundwater flow.

Unit – V

Soil and Water Conservation: Scope of soil and water conservation-Mechanics and types of erosion-their causes-Soil erosion control measures - bank protection-vegetative barriers-contour bund- contour trenches-contour stone walls-contour ditches-terraces-outlets and grassed waterways-Gully control structures - temporary and permanent - design of permanent soil conservation structures-Design of farm ponds and percolation ponds.

Text books and Reference books:

1. Pierce, F.J. and Frye, W. W. (1998): Advances in Soil and Water Conservation, Ann Arbor Press, Michigan.
2. Schwab, G. O., Fangmeier, D. D., Elliot, W. J. and Frevert, R. K. (1993): Soil and Water Conservation Engineering, 4th Ed. John Wiley and Sons Inc., USA
3. Murty, J.V.S. "Watershed Management", New Age Intl., New Delhi 1998.
4. Murthy, J.V.S., Watershed Management in India, Wiley Eastern, New Delhi, 1994 .
5. 5.Dilip Kumar Majumdar, Irrigation water management - Principles and Practice, PHI Pvt.Ltd.NewDelhi-1.
6. Madan Mohan Das&Mimi Das Saikia, Irrigation and water power Engineering,PHI learning pvt. Ltd., NewDelhi-1
7. Chatterjee, S. N., Water Resources Conservation and Management, Atlantic Publishers, 2008

OUTCOMES:

After completion of this course the student will be able to understand various concepts related to

1. Water harvesting methods and principles
2. Water recovery and reuse
3. Sustainable watershed management practices
4. Watershed modeling techniques
5. Methods of soil and water conservation

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IV Year B.Tech (Civil Engineering) – IISemester

Subject Code	Title of the Subject	L	T	P	C
17A80102	**DESIGN AND DRAWING OF IRRIGATION STRUCTURES (ELECTIVE-III)**	3	-	-	3

Design and drawing of the following irrigation structures.

1. Sloping glacis weir
2. Surplus weir.
3. Tank sluice with tower head
4. Type III Syphon aqueduct.
5. Canal regulator.

Final Examination pattern: Any two questions of the above Five designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

TEXT BOOKS:

1. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wiley eastern Ltd.
2. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard Book House.

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COLLEGE OF ENGINEERING:: ANANTAPUR

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80102	**ADVANCED FOUNDATION ENGINEERING (ELECTIVE –III)**	3	-	-	3

UNIT - I
SHALLOW FOUNDATIONS-I:

General Requirements Of Foundations. Types Of Shallow Foundations And The Factors Governing The Selection Of A Type Of Shallow Foundation. Bearing Capacity Of Shallow Foundations By Terzaghi's Theory And Meyerhof's Theory (Derivation Of Expressions And Solution To Problems Based On These Theories). Local Shear And General Shear Failure And Their Identification. Bearing Capacity Of Isolated Footing Subjected To Eccentric And Inclined Loads. Bearing Capacity Of Isolated Footing Resting On Stratified Soils-Button's Theory And Siva Reddy Analysis.

UNIT - II
ANALYSIS AND STRUCTURAL DESIGN OF R.C.C. FOOTINGS:
Analysis and structural design of R.C.C. isolated, combined and strap footings.

UNIT - III
DEEPFOUNDATIONS:
Pile foundations-types of pile foundations. Estimation of bearing capacity of pile foundation by dynamic and static formulae. Bearing capacity and settlement analysis of pile groups. Negative skin Friction, Pile load tests. Well foundations – elements of well foundation. Forces acting a on a well foundation. Depth and bearing capacity of well foundation. Design of individual components of well foundation (only forces acting and principles of design). Problems associated with well sinking.

UNIT - IV
SHEET PILE WALLS:
Cantilever sheet piles and anchored bulkheads, Earth Pressure diagram, Determination of depth of embedment in sands and clays-Timbering of Trenches – Earth Pressure Diagrams – Forces in struts.
DESIGN OF UNDER REAMED PILES FOUNDATIONS:
Under reamed piles-principle of functioning of under reamed pile-Analysis and structural design of under reamed pile.

UNIT - V
FOUNDATIONS IN PROBLEMATIC SOILS :
Foundations in black cotton soils- basic foundation problems associated with black cotton soils. Lime column techniques – Principles and execution. Use of Cohesive Non Swelling (CNS) layer below shallow foundations.

TEXT/ REFERENCE BOOKS :

1. Analysis and Design of Foundations and Retaining Structures- Shamsher Prakash, Gopal Ranjan and Swami Saran.
2. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
3.Geotechnical Engg. – C.Venkatramaiah. New age International Pvt . Ltd, (2002).

REFERENCES:-

1. Analysis and Design of Foundations – E.W.Bowles.
2. Foundation engineering by Brije.M.Das, Cengage pubilications,New Delhi.
3. Foundations Design and Construction – Tomlinson.
4. Foundation Design-Teng.

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COLLEGE OF ENGINEERING:: ANANTAPUR

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80102	**ARCHITECTURE AND TOWN PLANNING (ELECTIVE-III)**	3	-	-	3

Objective:- To know the western architecture and Indian architecture and also to gain knowledge on the principles of architectural design and historical background of town planning.

A) ARCHITECTURE:

UNIT-I

History of Architecture:

a) **Western Architecture:** Egyptian, Greek, Roman Architectures; influences- Comparative Analysis Orders.

b) **Indian Architecture:** Vedic age - Indus Valley civilization - Buddhist period; stambas, Slenstas. Roranas, Chaityans, Viharas with one example for each Hindu temples - Evaluation of Dravidian and Indo Aryan Styles - Principle factors. Temple of Aibole, Mahabalipuram, Madurai, Deograph, Bhuvaneshwar, Mount Abu.

c) Indo - Sarsanic Architecture; Mosque - Place- Fort Tomb.

UNIT - II

Architectural Design:

a) **Principle of designing** : Composition of plan Relationship between plan and elevation elements, form, surface Mass, Texture, Color, Tone.

b) **Principle of Compositions:** Unity, contrast, proportion, scale, Bab Rhuthm, character. Principles of Planning a Residence; Site Orientation prospect, Grouping, circulation, privacy, services and other factors.

UNIT – III

Introduction of Post-classic Architecture and contribution of eminent architects to modern period.

Brief summary of post - classic architecture - Indian and Western Architectural contribution of Edward Lutyens, Le Corbusier), Frank Lloyd Wrigt, Walter Groping, Vender Rohe, Caarihan, Nervi, Oscar Niemyer, Edward Durell stone.

B) TOWN PLANNING:

UNIT – IV

Historical Back Ground:

Town planning in India - town plans of Magad - town plans of ancient Indian towns; Mourya, Pataliputra vijayanagara, Delhi.Town planning in the West-town plans of Acropolis, Rome, Paris, London.

UNIT – V

Components of Planning;

a) Zoning

b) Roads and road Traffic.

a) Housing-Slums, Parks, Play grounds.
b) Public Utility Services.
c) Surveys and maps for planning.
d) Neighbourhood Planning.

Planning New town, planning standards, National and regional Planning, town planning and legislation.

Garden cities and satellite town

REFERENCES:

A) ARCHITECTURE

1. Indian Architecture – Vol:- I and II by Percy Brown, Taraporevala Publications, Bombay.
2. Planning and 'Design of Building -Section of Architecture by Y.S.Sane.
3. Modern Architecture and Design by Nikolans, Pevshar.
4. Modern Ideal Hol11nes for India by R.S.Deshpande.

B) TOWN PLANNING

1. Town and Country .Planning - A.J.Brown and H.M.Sherrard.
2. Town Design .- Federik Gibbard, Architectural press, London.
3. National Building Code of India.
4. Town Planning in India - Town and Country Planning Organisation, New Delhi 1962.
5. Regional Planning - Misra R.P., Mysore University.
6. Urban and Regional Planning; Principles and case studies by K.S.Rama Gouda, Mysore University Publications.
7. Town and Country Planning - P. Abercrombe, Oxford University press.

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IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80103	**REHABILITATION AND RETROFITING OF STRUCTURES (ELECTIVE –IV)**	3	-	-	3

UNIT – I

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage

UNIT – II

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

UNIT – III

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT.

UNIT – IV

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT – V

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

TEXT BOOKS:

1. Concrete Technology by A.R. Santakumar, Oxford University press
2. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.

REFERENCES

1. Defects and Deterioration in Buildings, EF & N Spon, London
2. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H. Ranso, (1981)
4. Building Failures : Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson, (1991).

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COLLEGE OF ENGINEERING:: ANANTAPUR

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80103	**TRANSPORTATION ENGINEERING - II (ELECTIVE –IV)**	3	-	-	3

OBJECTIVE: *It deal with different components of Transportation Engineering like Railway , Airport Engineering & harbours. Sound knowledge can acquire on components of airports, docks and harbours.*

Unit – I

Railway Engineering:

Introduction – permanent way components – cross section of permanent way – functions and requirements of rails, sleepers and ballast – types of gauges – creep of rails – theories related to creep – coning of wheels – adzing of sleepers – rail fastenings.

Unit – II

Geometric design of railway track

Gradients – grade compensation – cant and negative super elevation – cant deficiency – degree of curves – safe speed on railway track – points and crossings – layout and functioning of left hand turn out and right hand turn outs – station yards – signaling and interlocking.

Unit –III

Airport Engineering

Airport site selection – factors affecting site selection and surveys- runway orientation – wind rose diagram – basic runway length – correction for runway length – terminal area – layout and functions – concepts of terminal building – simple building , linear concept, pier concept and satellite concept – typical layouts .

Unit – IV

Geometric design of runways and taxiways

Aircraft characteristics – influence of characteristics on airport planning and design – geometric design elements of runway – standards and specifications as per - functions of taxiways – taxiway geometric design – geometric elements and standard specifications – runway and taxiway lighting.

Unit – V

Ports and Harbours

Requirements of ports and harbours – types of ports – classification of harbours – docks and types of docks – dry docks, wharves and jetties – breakwaters: layouts of different types of harbours and docks – dredging operations – navigation aids.

Text books:

1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi.
2. Satish Chandra and Agarwal, M.M. (2007) “Railway Engineering” Oxford Higher Education, University Press New Delhi.
3. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros.

4. A Text book of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. – (2001).
5. Railway Track Engineering by J.S.Mundrey

References:

1. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian, Scitech pubilishers.
2. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing House Pvt. Limited, 2009
3. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza, Chartor Publishers pvt ltd.

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COLLEGE OF ENGINEERING:: ANANTAPUR

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80103	**REMOTE SENSING AND GIS (ELECTIVE –IV)**	3	-	-	3

UNIT – I

INTRODUCTION TO PHOTOGRAMMETRY:

Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II

REMOTE SENSING :

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III

GEOGRAPHIC INFORMATION SYSTEM:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

TYPES OF DATA REPRESENTATION:

Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT – IV

GIS SPATIAL ANALYSIS:

Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V

WATER RESOURCES APPLICATIONS:

Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics.

Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

1 Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi.
2 Advanced surveying : Total station GIS and remote sensing – Satheesh Gopi – Pearson publication.

REFERENCES:

1. Fundamentals of remote sensing by gorge Joseph , Universities press, Hyderabad.
2. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4. Remote sensing and GIS by M.Anji reddy ,B.S.Pubiliications,New Delhi.
5. Remote Sensing and its applications by LRA Narayana University Press 1999.
6. GIS by Kang – tsung chang, TMH Publications & Co.,
7. Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell, Oxford Publishers 2004

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IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80104	**AIR POLLUTION AND CONTROL (ELECTIVE –V)**	3	-	-	3

UNIT – I

INTRODUCTION : Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources.

EFFECTS OF AIR POLLUTION : Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT-II

THERMODYNAMIC OF AIR POLLUTION:

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like Sox, Nox, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion.

PLUME BEHAVIOUR : Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

UNIT-III

POLLUTANT DISPERSION MODELS : Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

CONTROL OF PARTICULATES : Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control, Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV

CONTROL OF GASEOUS POLLUTANTS : General Methods of Control of Nox and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

UNIT – V

AIR QUALITY MANAGEMENT : Air Quality Management – Monitoring of SPM, SO; NO and CO Emission Standards.

TEXT BOOKS:

1. Air Quality by Thod godish, Levis Publishers, Special India Edition, New Delhi
2. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
3. Air pollution by Wark and Warner.- Harper & Row, New York.

REFERENCE:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.

2. Air Pollution and Control by K.V.S.G.Murali Krishna, Kousal & Co. Publications, New Delhi.
3. Enivronmental meteorology by S.Padmanabham murthy , I.K.Internationals Pvt Ltd,New Delhi.

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COLLEGE OF ENGINEERING:: ANANTAPUR

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80104	**PRESTRESSED CONCRETE (ELECTIVE –V)**	3	-	-	3

UNIT – I

INTRODUCTION:

Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

METHODS OF PRESTRESSING:-

Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT – II

LOSSES OF PRESTRESS:-

Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of stress in steel, slip in anchorage ,bending of member and wobble frictional losses.

UNIT – III

ANALYSIS & DESIGN OF SECTIONS FOR FLEXURE;-

Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

UNIT – IV

DESIGN OF SECTION FOR SHEAR :

Shear and Principal Stresses – Design for Shear in beams.

COMPOSITE SECTION:

Introduction – Analysis of stress – Differential shrinkage – General designs considerations.

UNIT – V

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS:

Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long term deflections.

TEXT BOOKS:

1. Prestressed Concrete by N. Krishna Raju; - Tata Mc.Graw HillPublications.
2. Prestressed Concrete by Ramamrutham,Dhanpatrai Publications
3. Prestressed Concrete design Praveen Nagrajan, Pearson publications, 2013 editions.

REFERENCES:

1. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.
2. Pre stressed concrete by E.G.Nawy

Codes/Tables:
Codes: BIS code on prestressed concrete, IS 1343 to be permitted into the examination Hall.
Code:15A01804c

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING:: ANANTAPUR

IV Year B.Tech (Civil Engineering) – II Semester

Subject Code	Title of the Subject	L	T	P	C
17A80104	**EARTHQUAKE RESISTANT STRUCTURES (ELECTIVE – V)**	3	-	-	3

UNIT – I

Introduction to Structural Dynamics : – Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

UNIT – II

Multi-Degree of Freedom (MDOF) Systems : - Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

UNIT – III

Earthquake Analysis : - Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi-storyed buildings – Use of response spectra.Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

UNIT – IV

Earthquake Engineering : - Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelegrams.Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column and joints

UNIT – V

Aseismic Planning : - Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings.

Shear walls : - Types – Design of Shear walls as per IS:13920 – Detailing of reinforcements.

TEXT BOOKS:

1. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi.
2. Dynamics of Structures – Clough & Penzien, McGraw Hill – International Edition.

3. Earthquake Resistant Design of Structures by S.K.Duggal, Oxford University press, New Delhi

REFERENCES:

1. Structural Dynamics by Mario Paaz , Academic Pubilishers.
2. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Printice Hall of India, New Delhi
3. Earthquake Tips by C.V.R.Murty, I.I.T. Kanpur.
4. Earthquake Hazardous Mitijation by R.Ayothiraman and Hemanth Hazarika, I.K.International Publishing House Pvt.Ltd., New Delhi.

Codes/Tables:

IS Codes: IS:1893, IS:4326 and IS:13920 to be permitted into the examinations Hall.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)
COURSE STRUCTURE
(w.e.f Academic Year 2019-20)

JNTUA CEA Curriculum
B. Tech Course Structure

CIVIL ENGINEERING

Semester - 0 (Theory - 8, Lab -7) Common for All Branches of Engineering				
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P-C**
1		Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-12-0
2		Career Counseling	MC	4-0-4-0
3		Orientation to all branches -- career options, tools, etc.	MC	6-0-0-0
4		Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	4-0-6-0
5		Proficiency Modules & Productivity Tools	ES	4-2-4-0
6		Assessment on basic aptitude and mathematical skills	MC	4-0-6-0
7		Remedial Training in Foundation Courses	MC	4-2-4-0
8		Human Values & Professional Ethics	MC	6-0-0-0
9		Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	4-2-4-0
10		Concepts of Programming	ES	4-0-4-0
Total				40-6-44-0

Semester - 1					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19A15101	Linear Algebra And Calculus	BS	3-1-0	4
2	19A15301	Engineering Chemistry	BS	2-1-0	3
3	19A10502	Python Programming	ES	3-1-0	4
4	19A10302	Engineering Workshop	LC	0-0-2	1
5	19A10301	Engineering Graphics	ES	1-0-4	3
6	19A15302	Engineering Chemistry Lab	BS	0-0-3	1.5
7	19A10505	Python Programming Lab	ES	0-0-3	1.5
				Total	**18**

Semester - 2					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19A10101	Strength of Materials-1	PC	3-1-0	4
2	19A15501	Communicative English 1	HS	2-0-0	2
3	19A15102	Differential Equations and Vector Calculus	BS	3-0-0	3
4	19A15203	Engineering Physics	BS	2-1-0	3
5	19A10102	Building Materials and Construction	**PC**	**3-1-0**	**4**
6	19A10103	Strength of Materials Lab	PC	0-0-3	1.5
7	19A10104	Civil Engineering Workshop	LC	0-0-3	1.5
8	19A15502	Communicative English Lab-1	HS	0-0-2	1
9	19A15204	Engineering Physics Lab	BS	0-0-3	1.5
				Total	**21.5**

Semester – 3					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A20601	Complex Variables, Transforms and PDE	BSC	3-0-0	3
2.	19A20101	Strength of Materials-II	PCC	2-1-0	3
3.	19A20102	Fluid Mechanics	PCC	2-1-0	3
4.	19A20103	Surveying	PCC	2-1-0	3
5.	19A20104	Engineering Geology	ESC	2-0-0	2
6.	19A20105	Structural Analysis-I	PCC	2-1-0	3
8.	19A20106	Surveying Lab	PCC	0-0-3	1.5
9.	19A20107	Engineering Geology Lab	ESC	0-0-3	1.5
10.	19A20602	Exploratory Data Analysis Lab	BSC	0-0-3	1.5
11.	19A10804	Environmental Science	MC	3-0-0	0
				Total	**21.5**

Semester – 4					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A20108	Structural Analysis-II	PCC	2-1-0	3
2.	19A20109	Building Planning and Drawing	PCC	2-1-0	3
3.	19A20110	Hydraulics and Hydraulic Machinery	PCC	2-1-0	3
4.	19A20111	Estimation, Costing and Valuation	PCC	2-1-0	3
5.	19A20603	Numerical Methods, Probability & Statistics	BSC	3-0-0	3
6.	19A20112	Water resources Engineering-I	PCC	3-0-0	3
7.	19A20901	Universal Human Values	HE	2-0-0	2
8.	19A20113	Computer Aided Drafting Lab	PCC	0-0-3	1.5
9.	19A20114	Fluid Mechanics and Hydraulic Machinery Lab	PCC	0-0-3	1.5
10.	19A28801	Biology For Engineers	MC	3-0-0	0
				Total	**23**

Semester – 5					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A50101	Design of Reinforced Concrete Structures	PCC	2-1-0	3
2.	19A50102	Concrete Technology	PCC	3-0-0	3
3.	19A50103	Environmental Engineering	HSMC	3-0-0	3
4.	19A50104	Geotechnical Engineering-I	PCC	2-1-0	3
5.	19A50105 19A50106 19A50107	**Professional Elective-I** 1.Water Resources Engineering-II 2. Subsurface Investigation and Instrumentation 3. Cost Effective Housing Techniques	PEC-1	3-0-0	3
6.	19A50108 19A50109 19A50110 19A50513T	**Open Elective-I** 1. Experimental Stress analysis 2. Environmental Impact Assessment 3. Project management 4.Introduction to Java Programming /Lab 19A50513L	OEC-1	2-1-0	3
7.	19A50111	Concrete Technology Lab	PCC	0-0-3	1.5
8.	19A50112	Geotechnical Engineering Lab	PCC	0-0-3	1.5
9.	19A50113	Socially Relevant Project	PR	0-0-1	0.5
10.	19A55401	Research Methodology	MC	3-0-0	0
				Total	**21.5**

Semester – 6					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A60101	Transportation Engineering-I	PCC	2-1-0	3
2.	19A60102	Geotechnical Engineering-II	PCC	2-1-0	3
3.	19A65501	English Language Skills	HSMC	3-0-0	3
4.	 19A60103 19A60104 19A60105	**Professional Elective-II** 1.Prestressed Concrete 2. Expansive Soils 3. Repair and Rehabilitation of structures	PEC-2	3-0-0	3
5.	 19A60106 19A60107 19A60108	**Open Elective-II /MOOCS** 1. Industrial Waste and Waste watermanagement 2.Intellectual Property Rights 3. Green Buildings	OEC-2	3-0-0	3
6.	 19A65401 19A65402 19A65403	**Humanities Elective-I** 1.Managerial Economics and Financial Analysis 2.Entrepreneurship and Incubation 3.Business Ethics and Corporate Governance	HSMC	3-0-0	3
7.	19A60109	Environmental Engineering Lab	PCC	0-0-3	1.5
8.	19A65502	English Language Skillslab	HSMC	0-0-3	1.5
9.	19A60110	Socially Relevant Project	PR	0-0-1	0.5
10.	19A65406	Constitution of India	MC	3-0-0	0
				Total	**21.5**

Semester – 7					
Course No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A70101	Finite Element Methods	PCC	2-1-0	3
2.	19A70102	Design of Steel Structures	PCC	2-1-0	3
3.	19A70103 19A70104 19A70105	**Professional Elective-III** 1. Ground Improvement Techniques 2. Transportation Engineering-II 3. Design and Drawing of Irrigation Structures	PEC-3	3-0-0	3
4.	19A70106 19A70107 19A70108	**Open Elective-III** 1. Air Pollution and Control 2. Environmental Economics 3. Disaster Management	OEC-3	3-0-0	3
5.	19A75401 19A75402 19A75403	**Humanities Elective-II** 1. Management Science 2. Organizational Behavior 3. Business Environment	HSMC	3-0-0	3
6.	19A70109	Computer Aided Designing and Drafting Lab	PCC	0-0-3	1.5
7.	19A70110	Highway Materials Lab	PCC	0-0-3	1.5
8.	19A70111	Seminar	PR	0-0-1	0.5
9.	19A70112	Project stage-1	PR	0-0-3	1.5
10.	19A70113	Industrial Training/ Internship/Skill Development/Research Project*	PR	------	2
				Total	**22**

*** Marks shall be awarded in 7th semester, but started at end of 6th semester and complete before beginning of 7th semester.**

Semester – 8					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A80101 19A80102 19A80103	**Professional Elective-IV** 1. Urban Transportation Planning 2. Building Construction Practice 3. Advanced Foundation Engineering	PEC-4	3-0-0	3
2.	19A80104 19A80105 19A80106	**Open Elective-IV** 1. Remote Sensing & GIS 2. Global Warming and Climatic changes 3. Health, Safety and Environmental	OEC-4	3-0-0	3
3.	19A80107	Project stage-ii	PR	0-0-14	7
				Total	**13**

Minor degree for 20 credits including Labs and Project

Hon's degree for additional 20 credit

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PROFESSIONAL ELECTIVES

S.No.	PEC-I	PEC-II	PEC-III	PEC-IV
1	Water Resources Engineering-II	Prestressed Concrete	Ground Improvement Techniques	Urban Transportation Planning
2	Subsurface Investigation and Instrumentation	Expansive Soils	Transportation Engineering-II	Building Construction Practice
3	Cost Effective Housing Techniques	Repair and Rehabilitation of Structures	Design and Drawing of Irrigation Structures	Advanced Foundation Engineering

OPEN ELECTIVES

S. No.	OEC-I	OEC-II	OEC-III	OEC-IV
1	Experimental stress analysis	Industrial waste and waste water management	Air pollution and control.	Remote Sensing and GIS
2	Environmental Impact Assessment	Intellectual property Rights	Environmental Economics	Global Warming and Climate changes
3	Project Management	Green Buildings	Disaster management	Health, Safety and Environmental Management Practices

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Areas for Socially Relevant Project in 5th Semester

a) Water quality analysis in a village /town

b) Survey camp

c) Road safety Audit

d) Environmental impact Audit

Areas for Socially Relevant Project in 6th Semester

a) Structural condition assessment of school buildings

b) Water resources management –Audit

c) Survey of waste management systems- Swach Bharat

d) Survey of modern building materials & properties

e) Survey on Implementation of Government Welfare schemes

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MINOR DEGREE IN CIVIL ENGINEERING

S.No	Course No	Course Name	L-T-P	Credits
1.		Strength of materials-I	2-1-0	3
2		Building materials and Construction	3-0-0	3
3		Surveying	2-1-0	3
4		Concrete Technology	3-0-0	3
5		Estimation, Costing and Valuation	2-1-0	3
6		Surveying Lab	0-0-3	1.5
7		Concrete Technology lab	0-0-3	1.5
8		Project	0-0-4	2
Total				20

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HONORS DEGREE IN CIVIL ENGINEERING

S.No	Course No	Course Name	L-T-P	Credits
1.		Soil Dynamics	2-1-0	3
2		Advanced structural Design	2-1-0	3
3		Construction Economics and Finance	2-1-0	3
4		Traffic Analysis	2-1-0	3
5		Sustainable River Basin Management	2-1-0	3
6		Mini Project	0-0-10	5
Total				20

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Course Code	**Title Of the Subject**	L	T	P	C
	Linear Algebra and calculus	3	1	0	4

SEMESTER-I

Course Objectives:

The objectives of this course are:

1.	This course will illuminate the students in the concepts of calculus and linear algebra.
2.	To equip the students with standard concepts and tools to develop the confidence and ability to handle various real world problems and their applications

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Acquire knowledge in finding the rank of the given matrix and its analysis, approximating the given function using series expansions partial differentiation to find the optimum value of the given function ,multiple integration and its applications evaluating special functions such as beta and gamma function.
2	Develop skills in problem solving of the variations in the properties of functions near the stationary points, eigen values and eigen vectors. Multiple integration and specialfunctions.
3	Develop skills in designing mathematical models involving system of linear equations, afunction of several variables using mean value theorem , optimization of function of two or three variables , technique of beta and gamma functions .
4	Develop analytical skills in providing solutions for complex problems involving Optimum of a multivariable function, Measuring the curve lengths
5	Applications of linear algebra ,differential calculus and integral calculus to solve engineering problems

Unit 1:Matrices

Rank of a matrix by echelon form, solving homogeneous and non-homogeneous system of linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Unit 2: Mean Value Theorems

Rolle‘s Theorem, Lagrange‘s mean value theorem, Cauchy‘s mean value theorem, Taylor‘s and Maclaurin theorems with remainders (without proof);

Unit 3: Multivariable calculus

Partial derivatives, total derivatives, chain rule, Euler‘s theorem, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Unit 4:Multiple Integrals

Double integrals, changing to polar coordinates, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves. Evaluation of triple integrals in Cartesian, cylindrical and spherical polar co-ordinates.

Unit 5:Special Functions

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Textbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

References:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.
4. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
5. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
6. Peter O‘neil, Advanced Engineering Mathematics, Cengage Learning.
7. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
8. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
9. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.

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Course Code	Title of the Subject	L	T	P	C
19A53101	**Engineering Chemistry**	**2**	**1**	**0**	**3**

Semester-I

Course Objectives:

The objectives of this course are:

1.	To familiarize engineering chemistry and its applications
2.	To impart the concept of soft and hard waters, softening methods of hard water
3	To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	**list** the differences between temporary and permanent hardness of water, **explain**the principles of reverse osmosis and electrodialysis. **compare**qualityofdrinking water withBIS and WHO standards. **illustrate**problems associated with hard water - scale and sludge**. explain** the working principles of different Industrial water treatment processes .
2	**apply** Nernst equation for calculating electrode and cell potentials, **apply** Pilling Bedworth rule for corrosion and corrosion prevention, **demonstrate** the corrosion prevention methods and factors affecting corrosion, **compare** different batteries and their applications
3	**explain** different types of polymers and their applications, **Solve the numerical problems based on Calorific value, select** suitable fuels for IC engines, **explain** calorific values, octane number, refining of petroleum and cracking of oils
4	explain the constituents of Composites and its classification Identify the factors affecting the refractory material, Illustrate the functions and properties of lubricants, demonstrate the phases and reactivity of concrete formation, identify the constituents of Portland cement, enumerate the reactions at setting and hardening of the cement
5	**summarize** the applications of SEM, TEM and X-ray diffraction in surface characterization, **explain** the synthesis of colloids with examples, **outline** the

	preparation of nanomaterials and metal oxides **identify** the application of colloids and nanomaterials in medicine, sensors and catalysis

Unit 1: Water Technology (8 hrs)

Introduction –Soft Water and hardness of water, Estimation of hardness of water by EDTA Method - Boiler troubles - scale and sludge, Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.

Unit 2: Electrochemistry and Applications: (10 hrs)

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zn-MnO_2 (Leclanche cell), Li Battery

Secondary cells – lead acid and lithium ion batteries- working of the batteries including cell reactions.

Fuel cells- Basic Principles and Working Principles of hydrogen-oxygen, methanol fuel cells

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion,cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

Unit 3: Polymers and Fuel Chemistry:(12 hrs)

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth and coordination polymerization,

Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of PVC and Bakelite

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol

Fuels – Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal, Liquid Fuels refining of petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values, cracking of oils; alternative fuels- propane, methanol and ethanol, bio fuels.

UNIT-4 Advanced Engineering Materials (8 hrs)

(i) Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications
(ii) Refractories- Classification, Properties, Factors affecting the refractory materials and Applications

(iii) Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils and Applications
(iv) Building materials- Portland Cement, constituents, phases and reactivity of clinker, Setting and Hardening of cement.

Unit 5: Surface Chemistry and Applications: (10 hrs)

Introduction to surface chemistry, colloids, micelle formation, synthesis of colloids (any two methods with examples), chemical and electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, solid-gas interface, solid-liquid interface, adsorption isotherm, applications of colloids and nanomaterials – catalysis, medicine, sensors.

Text Books:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi
2. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapathi Rai Publications, New Delhi

References:

1.A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi
2. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
3. Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi
4. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and AndraNaidu
5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

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Course Code	**Title of the Subject**	L	T	P	C
	Python Programming	3	1	0	4

SEMESTER-I

Course Objectives:

The objectives of this course are:

1.	To teach the fundamentals of Python
2.	To elucidate problem-solving using a Python programming language
3	To introduce a function-oriented programming paradigm through python
4	To train in the development of solutions using modular concepts
5	To introduce the programming constructs of python

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Explain the features of Python language (L2)
2	Select appropriate data structure for solving a problem (L4)
3	Design object oriented programs for solving real-world problems (L6)

Unit – I

Introduction: What is a program, Running python, Arithmetic operators, Value and Types. Variables, Assignments and Statements: Assignment statements, Script mode, Order of operations, string operations, comments.

Functions: Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.

Learning Outcomes: Student should be able to

1. List the basic constructs of Python (L1)
2. Solve the problems by applying modularity principle (L3)

Unit – II

Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.

Conditionals and Recursion: floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.

Fruitful Functions: Return values, Incremental development, Composition, Boolean functions, More recursion, Leap of Faith, Checking types,

Learning Outcomes: Student should be able to

1. Apply the conditional execution of the program (L3)
2. Apply the principle of recursion to solve the problems (L3)

Unit - III

Iteration: Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms.

Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.

Case Study: Reading word lists, Search, Looping with indices.

Lists: List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

Learning Outcomes: Student should be able to

1. Use the data structure list (L3)
2. Design programs for manipulating strings (L6)

Unit – IV

Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.

Tuples: Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

Files: Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.

Classes and Objects: Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.

Classes and Functions:

Learning Outcomes: Student should be able to

1. Apply object orientation concepts (L3)
2. Use data structure dictionaries (L3)
3. Organize data in the form of files (L6)

Unit – V

Classes and Functions: Time, Pure functions, Modifiers, Prototyping versus Planning

Classes and Methods: Object oriented features, Printing objects, The init method, The __str_method, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation

Inheritance: Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

The Goodies: Conditional expressions, List comprehensions, Generator expressions, any and all, Sets, Counters, defaultdict, Named tuples, Gathering keyword Args,

Learning Outcomes: Student should be able to

1. Plan programs using object orientation approach (L6)
2. Illustrate the principle of inheritance (L4)

Text books:

1. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.

Reference Books:

1. Martin C.Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.
3. R. Nageswara Rao, ―Core Python Programming‖, 2nd edition, Dreamtech Press, 2019

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Course Code	**Title of the Subject**	L	T	P	C
	Engineering Workshop	0	0	2	1

SEMESTER-I

Course Objectives:

The objectives of this course are:

1.	To familiarize students with wood working, sheet metal operations, fitting and electrical housewiring skills

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Apply wood working skills in real world applications.(L3)
2	Build different objects with metal sheets in real world applications.(L3)
3	Apply fitting operations in various applications.(L3)
4	Apply different types of basic electric circuit connections.(L3)
5	Understanding the soldering, brazing and principle of automobile wheel balancing,alignment and operation of power tools.(L2)

Wood Working:

Familiarity with different types of woods and tools used in wood working and make following

joints a) Half – Lap joint *
b) Mortise and Tenon joint *
c) Corner Dovetail joint or Bridle joint

Sheet Metal Working:

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a) Tapered tray *
b) Conical funnel *
c) Elbow pipe *
d) Brazing

Fitting:

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fit *
b) Dovetail fit *
c) Semi-circular fit
d) Wheel Balancing, tubeless tyre puncture and change of two wheeler tyre.

Electrical Wiring:

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series *
b) Two way switch *
c) Godown lighting
d) Tube light *
e) Three phase motor
f) Soldering of wires

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Course Code	**Title of the Subject**	L	T	P	C
	ENGINEERING GRAPHICS	1	0	4	3

SEMESTER-I

Course Objectives:

The objectives of this course are:

1.	Bring awareness that Engineering Drawing is the Language ofEngineers.
2.	To know how to represent letters and numbers in drawing sheets..
3	To know about the different types of the projections, projection of points, straight lines, planes and regular solids
4	To know sectional views and development of different types of surfaces.
5	To know about the projection of orthographic views, isometric views and isometric projections.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Draw various curves applied in engineering.(L2)
2	Plot the projection of points, Lines and planes.(L2)
3	Draw the projections of solids inclined to one or both planes. (L2)
4	Draw the sectional views and development of surfaces.(L2)
5	Draw the orthographic views, Isometric views and isometric projections.(L3)

UNIT-I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance

Curves used in practice:

a) Conic sections – Ellipse, Parabola, Hyperbola & Rectangular Hyperbola (general method)
b) Cycloid, Epicycloid and Hypocycloid – Normal and Tangent
c) Involutes – Normal and Tangent

Learning Outcomes:

At the end of this unit the student will be able to

1. Understand the Printing of Letters and dimensioning.(L1)

2. Draw the geometric constructions; drawing parallel and perpendicular lines, and to construct circles, arcs, tangencies, and irregular curves (L6)
3. Construct the Conic sections and cycloidal curves.(L6)

UNIT –II

Principles of orthographic projections – First and Third angle projections Projection of points., Projections of lines inclined to one plane and inclined to both planes – True length, true angles of projected lines – Projection of regular planes inclined to one plane and both planes by rotational method.

Learning Outcomes:

At the end of this unit the student will be able to

1. Understand the Orthographic Projection in four quadrants (L2)
2. Project the points, lines and planes (L6)

UNIT –III

Projection of solids inclined to one plane and inclined to both planes by rotational/auxiliary method – Prism, Cylinder, Pyramid, Cone.

Learning Outcomes:

At the end of this unit the student will be able to

1. Project the solids inclined to one or both planes. (L6)
2. draw the solids by auxiliary method. (L6)

UNIT –IV

Sections of solids: Sections and Sectional views of regular solids – Prism, Cylinder, Pyramid, Cone – True shapes

Development of solids- Prism, Cylinder, Pyramid, Cone

Interpenetration of Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs cone, square prism Vs square prism.

Learning Outcomes:

At the end of this unit the student will be able to

1. Project the sectional view of regular solids.(L6)
2. Draw the true shapes of the sections.(L2)
3. Draw the development of surfaces of the solids.(L6)
4. Develop the sectional parts of the solids.(L2)

UNIT –V

Orthographic projections: Conversion of Pictorial views to orthographic views – Conventions.
Isometric projection: Isometric views of lines, plane figures, simple and truncated solids – orthographic views into isometric views.

Learning Outcomes:

At the end of this unit the student will be able to

1.Draw the orthographic views with dimensions.

2. Draw the Isometric views and isometric projections.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers
2. Engineering Drawing, K.L. Narayana & P. Kannaih, Scitech Publishers, Chennai.

REFERENCES:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers.
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal/New age Publishers
4. Engineering Graphics, John & John.

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Course Code	Title of the Subject	L	T	P	C
19A53103	**Engineering Chemistry lab**	0	0	3	1.5

SEMESTER-I

Course Objectives:

The objectives of this course are:

1.	Verify the fundamental concepts with experiments.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	determine the cell constant and conductance of solutions (L3)
2	prepare advanced polymer materials (L2)
3	determine the physical properties like surface tension, adsorption and viscosity (L3)
4	estimate the Iron and Calcium in cement (L3)
5	calculate the hardness of water (L4)

LIST OF EXPERIMENTS

1. Determination of Hardness of a groundwater sample.
2. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. Determination of Strength of an acid in Pb-Acid battery
6. Preparation of a polymer
7. Determination of percentage of Iron in Cement sample by colorimetry
8. Estimation of Calcium in port land Cement
9. Adsorption of acetic acid by charcoal
10. Determination of percentage Moisture content in a coal sample
11. Determination of Viscosity of lubricating oil by Red Viscometer 1
12. Determination of Flash and Fire points of fuels
13. Determination of Calorific value of gases by Junker‘s gas Calorimet

TEXT BOOKS:1. Vogel‘s Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, Pearson
Education.
2. Chemistry Practical – Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera

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Course Code	**Title of the Subject**	L	T	P	C
	Python Programming Lab	0	0	3	1.5

SEMESTER-I

Course Objectives:

The objectives of this course are:

1.	To train solving computational problems
2	To elucidate solving mathematical problems using Python programming language
3	To illustrate the features of Python language

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Design solutions to mathematical problems (L6)
2	Organize the data for solving the problem (L6)
3	Develop Python programs for numerical and text based problems (L3)
4	Select appropriate programming construct for solving the problem (L5
5	Illustrate object oriented concepts (L3)

Laboratory Experiments

1. Install Python Interpreter and use it to perform different Mathematical Computations. Try to do all the operations present in a Scientific Calculator
2. Write a function that draws a grid like the following:

```
+ - - - -  + - - - -  +
|          |          |
|          |          |
|          |          |
|          |          |
+ - - - -  + - - - -  +
|          |          |
|          |          |
|          |          |
|          |          |
```

+ - - - - + - - - - +

3. Write a function that draws a Pyramid with # symbols

```
          #
        # # #
      # # # # #
    # # # # # # #
  # # # # # # # # #
          .
          .
          .
```

Up to 15 hashes at the bottom

4. Using turtles concept draw a wheel of your choice
5. Write a program that draws Archimedean Spiral
6. The letters of the alphabet can be constructed from a moderate number of basic elements, like vertical and horizontal lines and a few curves. Design an alphabet that can be drawn with a minimal number of basic elements and then write functions that draw the letters. The alphabet can belong to any Natural language excluding English. You should consider at least Ten letters of the alphabet.
7. The time module provides a function, also named time that returns the current Greenwich Mean Time in ―the epoch‖, which is an arbitrary time used as a reference point. On UNIX systems, the epoch is 1 January 1970.

   >>> import time

   >>>time.time()

   1437746094.5735958

   Write a script that reads the current time and converts it to a time of day in hours, minutes, and seconds, plus the number of days since the epoch.
8. Given $n+r+1 <= 2^r$. n is the input and r is to be determined. Write a program which computes minimum value of r that satisfies the above.
9. Write a program that evaluates Ackermann function
10. The mathematician Srinivasa Ramanujan found an infinite series that can be used to generate a numerical approximation of 1/ $\boldsymbol{\pi}$:
11. Write a function called estimate_pi that uses this formula to compute and return an estimate of $\boldsymbol{\pi}$.

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

It should use a while loop to compute terms of the summation until the last term is smaller than 1e-15 (which is Python notation for 10^{-15}). You can check the result by comparing it to math.pi.

12. Choose any five built-in string functions of C language. Implement them on your own in Python. You should not use string related Python built-in functions.
13. Given a text of characters. Write a program which counts number of vowels, consonants and special characters.
14. Given a word which is a string of characters. Given an integer say _n‘. Rotate each character by _n‘ positions and print it. Note that _n‘ can be positive or negative.
15. Given rows of text, write it in the form of columns.
16. Given a page of text. Count the number of occurrences of each latter (Assume case insensitivity and don‘t consider special characters). Draw a histogram to represent the same
17. Write program which performs the following operations on list‘s. Don‘t use built-in functions
    a) Updating elements of a list
    b) Concatenation of list‘s
    c) Check for member in the list
    d) Insert into the list
    e) Sum the elements of the list
    f) Push and pop element of list
    g) Sorting of list
    h) Finding biggest and smallest elements in the list
    i) Finding common elements in the list

18. Write a program that reads a file, breaks each line into words, strips whitespace and punctuation from the words, and converts them to lowercase.

19. Go to Project Gutenberg (http://gutenberg.org) and download your favorite out-of-copyright book in plain text format. Read the book you downloaded, skip over the header information at the beginning of the file, and process the rest of the words as before. Then modify the program to count the total number of words in the book, and the number of times each word is used. Print the number of different words used in the book. Compare different books by different authors, written in different eras.

20. Go to Project Gutenberg (http://gutenberg.org) and download your favorite out-of-copyright book in plain text format. Write a program that allows you to replace words, insert words and delete

words from the file.

21. Consider all the files on your PC. Write a program which checks for duplicate files in your PC and displays their location. Hint: If two files have the same checksum, they probably have the same contents.

22. Consider turtle object. Write functions to draw triangle, rectangle, polygon, circle and sphere. Use object oriented approach.

23. Write a program illustrating the object oriented features supported by Python.

24. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.

25. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.

26. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.(0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59)

Reference Books:

1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python 3", 3rd edition, Available at http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016
3. DainelY.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)

Course Code	Title of the Subject	L	T	P	C
	STRENGTH OF MATERIALS-I	3	1	0	4

SEMISTER-II

Course Objectives:

The objectives of this course are:

- To make the student understand how to resolve forces and moments in a given system
- To make the student able to analyze the trusses.
- To demonstrate the student to determine the centroid and second moment of area
- To make the student understand the concepts of stress, strain, generalized Hooke's law, elastic moduli and strain energy.
- To impart procedure for drawing shear force and bending moment diagrams for beams.
- To make the student able to analyze flexural stresses in beams due to different loads.

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Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Understand the different types of force systems
2.	Analysis of trusses by using different methods
2	Determine the centroid and moment of inertia for different cross-sections
3	Understand the concepts of stress, strain, generalized Hooke's law, elastic moduli and strain energy.
4	Develop shear force and bending moment diagrams for different load cases.
5	Compute the flexural stresses for different load cases and different cross-sections.

UNIT-I

Introduction to Mechanics: Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space Resultant -Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial systems- Analysis of trusses by Method of Joints & Sections- Friction:Types of friction -Limiting friction -Laws of Friction -static and Dynamic Frictions - Motion of Bodies.

UNIT-II

Centroid and Center of Gravity: Introduction – Centroids of rectangular, circular, I, L and T sections - Centroids of built-up sections. Area moment of Inertia: Introduction – Definition of Moment of Inertia of rectangular, circular, I, L and T sections - Radius of gyration. Moments of Inertia of

Composite sections.

UNIT – III

Simple Stresses and Strains:

Types of stresses and strains – Hooke ‘s law – Stress – strain diagram for mild steel – working stress – Factor of safety – lateral strain, Poisson‘s ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of Varying section – Composite bars – Temperature stresses. Strain energy – Resilience – Gradual, Sudden, impact and shock loadings – simple applications.

UNIT – IV

Shear Force and Bending Moment:

Definition of beam – types of beams – Concept of Shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and over changing beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – point of contra flexure – Relation between S.F, B.M and rate of loading at section of a beam.

UNIT – V

Flexural Stresses:

Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/Y = E/R$ – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hallow), I, T, Angle and Channel Sections – Design of simple beam sections.

TEXT BOOKS:

1. R.K Bansal, Engineering Mechanics, Lakshmi Publications.
2. R. Subramanian, Strength of Materials, Oxford University Press.

REFERENCES:

1. Shesagiri Rao, Engineering Mechanics, Universities Press, Hyderabad.
2. S. Timoshenko, D.H. Young and J.V. Rao, Engineering Mechanics, Tata McGraw-Hill Company.
3. R. K. Bansal, Strength of Materials, Lakshmi Publications House Pvt. Ltd.
4. Sadhu Singh, Strength of Materials, Khanna Publishers 11th edition 2015.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)

Course Code	**Title of the Subject**	L	T	P	C
	Communicative English I	2	0	0	2

SEMESTER-I

Course Objectives:

The objectives of this course are:

1.	Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
2	Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
3	Help improve speaking skills through participation in activities such as role plays,discussions and structured talks/oral presentations
4	Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
5	Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
2	Apply grammatical structures to formulate sentences and correct word forms
3	Analyze discourse markers to speak clearly on a specific topic in informal discussions
4	Evaluate reading/listening texts and to write summaries based on global comprehensionof these texts.
5	Create a coherent paragraph interpreting a figure/graph/chart/table

Unit 1

Lesson: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information. Reading for Writing :Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs;

nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

At the end of the module, the learners will be able to

understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information

ask and answer general questions on familiar topics and introduce oneself/others

employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information

recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs

form sentences using proper grammatical structures and correct word forms

Unit 2

Lesson: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts. Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks. Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. Grammar and Vocabulary: Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

At the end of the module, the learners will be able to

comprehend short talks on general topics

participate in informal discussions and speak clearly on a specific topic using suitable discourse markers

understand the use of cohesive devices for better reading comprehension

write well structured paragraphs on specific topics

identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit 3

Lesson: The Death Trap: Saki

Listening: Listening for global comprehension and summarizing what is listened to. Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

At the end of the module, the learners will be able to

comprehend short talks and summarize the content with clarity and precision

participate in informal discussions and report what is discussed

infer meanings of unfamiliar words using contextual clues

write summaries based on global comprehension of reading/listening texts

use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit4

Lesson: Innovation: Muhammad Yunus

Listening: Making predictions while listening to conversations/ transactional dialogues without

video; listening with video. Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Learning Outcomes

At the end of the module, the learners will be able to
infer and predict about content of spoken discourse
understand verbal and non-verbal features of communication and hold formal/informal conversations
interpret graphic elements used in academic texts
produce a coherent paragraph interpreting a figure/graph/chart/table
use language appropriate for description and interpretation of graphical elements

Unit 5

Lesson: Politics and the English Language: George Orwell
Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides. Reading: Reading for comprehension. Writing: Writing structured essays on specific topics using suitable claims and evidences. Grammar and Vocabulary: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Learning Outcomes

At the end of the module, the learners will be able to
take notes while listening to a talk/lecture and make use of them to answer questions
make formal oral presentations using effective strategies
comprehend, discuss and respond to academic texts orally and in writing
produce a well-organized essay with adequate support and detail
edit short texts by correcting common errors

Prescribed Text:

Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan

Reference Books

Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.

Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.

Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.

Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.

Oxford Learners Dictionary, 12th Edition, 2011

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COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)

Course Code	Title of the Subject	L	T	P	C
	Differential equations and vector calculus	3	0	0	3

SEMESTER-II

Course Objectives:

The objectives of this course are:

1.	This course will illuminate the students in the concepts of differential equations and vector calculus
2.	To equip the students with standard concepts and tools to develop the confidence and ability to handle various real world problems and their applications.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Acquire knowledge in finding the solution of higher order linear differential equations, partialdifferential equations , vector differentiation and integration of vector functions..
2	Develop skills in problem solving of the differential equation , properties of oscillatory electrical circuits and heat transfer in engineering systems, partial differential equations through different evaluation methods.
3	Develop skills in designing mathematical models involving R – C and L – C – R oscillatory electrical circuits, mechanical oscillation, deflection of beams, engineering concepts involving lengths of curves and areas of planes, flux across surfaces.
4	Develop analytical skills in providing solutions for complex problems non homogeneous linear differential equations, oscillatory electrical circuits , partial differential equations ,vector differentiation involving and integrations
5	Applications of differential equations and vector calculus to solve engineering problems

UNIT 1: Linear differential equations of higher order 8hrs

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules forfinding particular integral, method of variation of parameters.

UNIT 2: Applications of Linear Differential Equations 8hrs

Cauchy‘s and Legendre‘s linear equations, simultaneous linear equations with constant coefficients, Applications to L-C-R Circuit problems and Mass spring system.

UNIT 3: Partial Differential Equations **8 hrs**

First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

UNIT4: Vector differentiation **8hrs**

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT 5: Vector integration **8hrs**

Line integral-circulation-work done, surface integral-flux, Green‘s theorem in the plane (without proof), Stoke‘s theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Textbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

References:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
6. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
7. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
8. Peter O‘neil, Advanced Engineering Mathematics, Cengage Learning.
9. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
10. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
11. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand..

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COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)

Course Code	Title of the Subject	L	T	P	C
	ENGINEERING PHYSICS	2	1	0	3

SEMESTER-II

Course Objectives:

The objectives of this course are:

1.	To make a bridge between the physics in school and engineering courses.
2.	To familiarize the concepts of theoretical acoustics to practical use in engineering field. To explain the significance of ultrasound and its application in NDT for diversified engineering application.
3	Understand the basic concepts of mechanics and oscillations in correlation to
4	To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications.
5	To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
6	To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications. Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nano materials, their properties and applications in modern emerging technologies are elicited.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	**Identify** forces and moments in mechanical systems using scalar and vector techniques (L3). **Interpret** the equation of motion of a rigid rotating body (torque on a rigid body), Simple harmonic oscillators, Damped harmonic oscillator, Heavy, Forced oscillations, Resonance for consideration in designing technological applications. (L3)
2	**Explain** sound waves and its propagation /interaction with construction material in design of buildings (L2). **Analyze** acoustic parameters of typically used materials in buildings (L4). **Recognize** sound level disruptors and their application in architectural acoustics (L2). **Identify** the use of ultrasonics in diversified fields of engineering (L3)
3	**Explain** various types of emission of radiation (L2). **Identify** the role of laser in engineering applications (L3). **Describe** the construction and working principles of various types of lasers (L1). **Explain** the working principle of optical fibers (L2).

	Classify optical fibers based on refractive index profile and mode of propagation (L2). **Identify** the applications of optical fibers in medical, communication and other fields(L2). **Apply** the fiber optic concepts in various fields (L3).
4	**Explain** the need of coherent sources and the conditions for sustained interference (L2). **Identify** applications of interference in engineering (L3). **Analyze** the differences between interference and diffraction with applications (L4). **Illustrate** the concept of polarization of light and its applications (L2). **Classify** ordinary polarized light and extraordinary polarized light (L2) The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics.
5	**Explain** the concept of dielectric constant and polarization in dielectric materials (L2). **Summarize** various types of polarization of dielectrics (L2). **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics (L2). **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2). **Explain** the applications of dielectric and magnetic materials (L2). **Apply** the concept of magnetism to magnetic devices (L3) **Identify** the nano size dependent properties of nanomaterials (L2). **Illustrate** the methods for the synthesis and characterization of nanomaterials (L2). **Apply** the basic properties of nanomaterials in various Engineering branches (L3).

Unit-1: Introduction to Mechanics and Oscillations

Introduction to Mechanics and Oscillations-Basic laws of vectors and scalars-Rotational frames-Conservative forces – F = - grad V, torque and angular momentum – Simple harmonic oscillators-Damped harmonic oscillator-Heavy, critical and under damping- Energy decay in damped harmonic oscillator- Forced oscillations – Resonance.

Unit-II: Acoustics and Ultrasonics

Acoustics: Introduction to acoustics – Reverberation – Reverberation time– Sabine‘s formula-Derivation using growth and decay method – Absorption coefficient and its determination –Factors affecting acoustics of buildings and their remedies.

Ultrasonics: Introduction, Properties and Production by magnetostriction & piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications

Unit-III: Lasers and Fiber optics

Lasers: Introduction – Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein‘s coefficients – Population inversion – Pumping mechanisms – Nd:YAG laser – He-Ne laser – Applications of lasers.

Fiber optics- Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance Angle-Numerical Aperture-Classification of fibers based on refractive index profile – Propagation of electromagnetic wave through optical fibers – Modes -Importance of V-number-Fiber optic sensors (Pressure/temperature/chemical change)

Unit-IV: Wave Optics

Interference-Principle of superposition –Interference of light – Conditions for sustained interference-interference in thin films- Colors in thin films-Newton‘s Rings-Determination of wavelength and refractive index.

Diffraction-Introduction-Fresnel and Fraunhofer diffraction-Fraunhofer diffraction due to single slit and double slit – Diffraction grating- Grating spectra.

Polarization-Polarization by double refraction-Nicol‘s Prism--Half wave and Quarter wave plates-Engineering applications of Polarization.

UNIT V:Engineering Materials

Dielectric Materials: Introduction-Dielectric polarization- Dielectric constant- Types of polarizations: Electronic and Ionic, Orientation Polarizations (Qualitative) - Lorentz (Internal) field-Clausius-Mossottiequation-Applications of Dielectrics: Ferroelectricity and Piezoelectricity.

Magnetic Materials: Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials-Hysteresis - Soft and hard magnetic materials-Applications.

Nanomaterials: Introduction – Surface area and quantum confinement –Physical properties: electrical and magnetic properties- Synthesis of nanomaterials: Top-down: Ball Milling, Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.

Prescribed Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu& Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press.

Reference Books:

Introduction to modern optics – Grant R Fowles
A text book on Optics – Brijlal& Subramanyam
Laser Fundamentals – William T. Silfvast, Cambridge University Press
Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley
&SonsIntroduction to Nanotechnology – C P Poole and F J Owens, Wiley
Hand Book of Non-destructive evaluation, C.J.Hellier, McGraw-
Hill Engineering Physics – K.Thyagarajan, MacGraw Hill
Publishers Engineering Physics – M.R.Srinivasan, New Age
Publications Engineering Physics – D K Pandey, S. Chaturvedi,
Cengage Learning
Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press

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COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)

Course Code	Title of the Subject	L	T	P	C
	BUILDING MATERIALS ANDCONSTRUCTION	3	1	0	4

SEMESTER-II

Course Objectives:

The objectives of this course are:

1.	To give the students a basic idea about the traditional and modern construction materials a brief knowledge on building components and its construction methodologies

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Identify and characterize the properties of various building materials.
2	Understand the modern building materials, properties and their uses
3	Understand the importance of insulating materials in building construction.
4	Understand the importance of building structural components and its services.
5	Understand the principles and methods of construction of building components

UNIT – I

INTRODUCTION TO BUILDING MATERIALS

Traditional & OrganicBuilding Materials – Stone – Dressing of Stones – Modern Building Materials – Bricks – Manufacturing process – Ceramic Products – Manufacturing Process – Building Materials for Low Cost Housing – Utilisation of Wastes for Alternative Building Materials –Sustainable Materials in Construction, Concepts of energy efficient building envelopes as per ECBC – National Standards.

UNIT – II

GLASS:

Introduction to Fenestration- Functions of Glass in Buildings – Constituents and Classification of Glass – Manufacturing Process –Properties of Glass – Common Types of Glass – Special Glass – Advantages and Disadvantages of Glass – National Standards such as ECBC.

PLASTIC: Introduction – Polymerisation – Classification of Plastics – Commonly Used Plastics – Moulding and Fabricating for Plastic Products – Applications – Advantages – Disadvantages – Intelligent Use of Plastics in Buildings – National Standards such as ECBC.

UNIT – III

INSULATING MATERILAS

Thermal Insulating Materials: Introduction – Thermal Insulation – Heat Transfer Fundamentals –

Thermal Properties of Insulating Materials – Selection of Insulating Materials – Classification of Insulation materials – Reflective Insulation Systems – Commonly Used Building Insulation Materials – Insulation that Should not be Used – National Standards such as ECBC.
Sound Insulating Materials: Introduction – Basics of Acoustics – Sound Absorption or Insulation – Green Insulation – Cool Roof, Green Roof, Power Roof – National Standards such as ECBC.

UNIT – IV

STRUCTURAL COMPONENTS:–

Foundations – classification of Foundations – consideration in selection of foundation types – Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars – Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures – Components – Construction Procedure – Panel walls – National Standards such as ECBC.

UNIT – V

INTERNAL CONSTRUCTION AND FINISHES

Internal elements – Internal walls – Construction joints – Internal walls, fire protection –separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door sets – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of Paints – Types of Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints –Emulsion Paints – Whitewash and Colourwash – Application of Paints –Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards such as ECBC.

TEXT BOOKS:

1. Building Material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
3. A Textbook on Building Construction by S.K.Sharma, S.ChandPubilishers.
4. Building Materials by M.L.Gambhir, TMH Pubilishers.
5. ECBC (Energy Conservation Building Code).

REFERENCES:

1. Building construction by W.B.Mckay, Vol.I, II, III & IV Pearson Publications, 2013 edition.
2. R.Chudly –Construction Technology – Volumes I and II‖ 2nd Edition, Longman, UK, 1987.
3. Building materials by S.C.Rangawala, CharotarPubilishing House, Anand- INDIA.
4. Building Construction by S.C.Rangawala, CharotarPubilishing House, Anand- INDIA
5. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
6. BEE (Bureau of Energy Efficiency) Manuals on Energy efficient building envelope concepts.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)

Course Code	Title of the Subject	L	T	P	C
	STRENGTH OF MATERIALS LAB	0	0	3	1.5

SEMESTER-II

Course Objectives:

The objectives of this course are:

1. To determine the tensile strength and yield parameters of mild steel
2. To find out flexural strengths of Steel/Wood specimens and measure deflections
3. To determine the torsion parameters of mild steel bar
4. To determine the hardness numbers, impact and shear strengths of metals
5. To determine the load-deflection parameters for springs

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1. Conduct tensile strength test and draw stress-strain diagrams for ductile metals
2. Perform bending test and determine load-deflection curve of steel/wood
3. Able to conduct torsion test and determine torsion parameters
4. Perform hardness, impact and shear strength tests and calculate hardness numbers, impact and shear strengths
5. Able to conduct tests on closely coiled and open coiled springs and calculate deflections

LIST OF EXERCISES:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test.
5. Hardness test.
6. Spring test.
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell‘s Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

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Course Code	**Title of the Subject**	L	T	P	C
	Civil Engineering Workshop	0	0	3	1.5

SEMESTER-II

Course Objectives
The student will be able

1. To analyze the plan and carry out setting out of building with the help of tape and cross staff
2. To construct brick wall of English bond with different thickness
3. To determine the centre of gravity & moment of inertia of rolled steel sections by actual measurements
4. To successfully apply the various finishing works onto a wall
5. To successfully install various plumbing fixtures like Tap, T-Joint, Elbow, Bend, threading etc.,

LIST OF EXPERIMENTS:

1) Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape only.

2) Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape and cross staff.

3) Construct a wall of height 50 cm and wall thickness 1½ bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.

4) Construct a wall of height 50 cm and wall thickness 2 bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.

5) Computation of Centre of gravity and Moment of inertia of a given rolled steel section by actual measurements.

6) Installation of plumbing and fixtures like Tap, T-Joint, Elbow, Bend, Threading etc;

7) Plastering and Finishing of wall

8) Application of wall putty and painting a wall

9) Application of base coat and laying of Tile flooring of one square meter

10) Preparation of soil cement blocks for masonry and testing for compressive strength

11) Casting and testing of Fly ash Blocks

12) Preparation of cover blocks for providing cover to reinforcement

.

Course Outcomes

The student will be able to

1. Set-out a building as per the given plan using tape and cross staff
2. Construct brick wall of English bond with different thicknesses
3. Determine the center of gravity & moment of inertia of rolled steel sections by actual measurements
4. Apply the various finishing works onto a wall
5. Install various plumbing fixtures like Tap, T-Joint, Elbow, Bend, threading etc.,

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Course Code	**Title of the Subject**	L	T	P	C
	Communicative English Lab	0	0	2	1

SEMESTER-II

Course Objectives:

The objectives of this course are:

1.	students will be exposed to a variety of self instructional, learner friendly modes of language learning
2	students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
3	students will learn better pronunciation through stress, intonation and rhythm
4	students will be trained to use language effectively to face interviews, group discussions, public speaking
5	students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
2	Apply communication skills through various language learning activities
3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for betterlistening and speaking comprehension.
4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
5	Create awarenesson mother tongue influenceand neutralize it in order to improve fluency in spoken English

Unit 1

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

Learning Outcomes

At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit 2

1. JAM
2. Small talks on general topics
3. Debates

Learning Outcomes

At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

Unit 3

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building
4. **Learning Outcomes**

At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

Unit4

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

Learning Outcomes

At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

Unit 5

Oral Presentations

Précis Writing and Paraphrasing

Reading Comprehension and spotting errors

Learning Outcomes : At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors

Suggested Software

- Young India Films
- Walden Infotech
- Orell

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.

- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

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Course Code	Title of the Subject	L	T	P	C
	ENGINEERING PHYSICS LABORATORY	0	0	3	1.5

SEMESTER-II

Course Objectives: The objectives of this course are:

1.	To make the students gain practical knowledge to co-relate with the theoretical studies. To develop practical applications of engineering materials and use of principle in the right way to implement the modern technology

Course Outcomes (CO):
On Completion of the course, the students will be able to:

1	**Operate** optical instruments like microscope and spectrometer (L2)
2	**Estimate** the desired physical parameters by performing the concerned experiments (L2)
3	**Plot** the concerned physical parameter to know their related variations (L3)
4	**Identify** the role of various physical phenomenon in relation with the experimental concepts (L3)

LIST OF EXPERIMENTS

Any TEN of the following experiments has to be performed during the SEMESTER

1. Laser: Determination of wavelength using diffraction grating.
2. Laser: Determination of Particle size.
3. Determination of spring constant of springs using Coupled Oscillator
4. Determination of ultrasonic velocity in liquid (Acoustic grating)
5. Determination of dielectric constant and Curie temperature of a ferroelectric material.
6. Study of B-H curve of ferromagnetic material
7. Study of variation of magnetic field along the axis of a current carrying coil - Stewart-Gee‘s Method
8. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)
9. Determination of numerical aperture and acceptance angle of an optical fiber.
10. Determination of thickness of thin object by wedge method.
11. Determination of radius of curvature of lens by Newton‘s rings.
12. Determination of wavelengths of different spectral lines of mercury spectrum using diffraction grating in normal incidence method.
13. Determination of dispersive power of the prism
14. Sonometer: Verification of the three laws of stretched strings
15. Measurement of magnetic susceptibility by Kundt‘s tube method.

Note: Out of 10 experiments, two experiments will be performed using virtual laboratory.

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Semester-3 Syllabus

Course Code	Title of the Subject	L	T	P	C
	COMPLEX VARIABLES, TRANSFORMS & PARTIAL DIFFERENTIALEQUATIONS	0	0	3	1.5

Course Objectives:

The objectives of this course are:

1.	This course aims at providing the student to acquire the knowledge on the calculus of functionsof complex variables
2	The aim is to analyze the solutions of partial differential equations.

Course Outcomes (CO):

1	**Acquire knowledge in** a. Fourier series. b. Laplace transforms and their applications. c. Find the derivatives of complex functions. d. Solving Partial Differential equations e. Heat transfer and wave motion.
2	**To Develop skills in analyzing the** a. Properties of Fourier series for a given function. b. Understand the analyticity of complex functions and conformal mapping. c. Apply Cauchy‘s integral formula and Cauchy‘s integral theorem to evaluate improper integrals along contours. d. Engineering systems & processes involving wave forms and heat transfer. Partial differential equations through different evaluation methods
3	**To develop skills in designing mathematical models for** a. Understand the usage of Laplace transforms. b. Apply Cauchy‘s integral theorem. c. Understand singularities of complex functions. d. Problems involving heat transfer and wave forms.
4	**To develop analytical tools in solving the problems involving** a.Fourier series b.Laplace transforms

	c.Heat transfer and wave motion. d.Evaluate the Fourier series expansion of periodic functions.
5	**Use relevant mathematical technique for evaluating** a. Evaluate improper integrals of complex functions using Residue theorem. b. Laplace transforms c. Solve applications of partial differential equations.

On Completion of the course, the students will be able to:

Unit-I: Complex Variable – Differentiation:

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation,Cauchy-Riemann equations, analytic functions (exponential, trigonometric, logarithm), harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method-Conformal mappings-standard and special transformations (sin z, e_z, cos z, z_2) Mobius transformations (bilinear) and their properties.

Unit Outcomes:

Students will be able to

- Understand functions of Complex variable and its properties.
- Find derivatives of complex functions.
- Understand the analyticity of complex functions.

Understand the conformal mappings of complex functions

Unit-II: Complex Variable – Integration:

Line integral-Contour integration, Cauchy‘s integral theorem, Cauchy Integral formula,Liouville‘s theorem (without proof) and Maximum-Modulus theorem (without proof); power series expansions: Taylor‘s series, zeros of analytic functions, singularities, Laurent‘s series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi circle with f(z) not having poles on real axis).

Unit Outcomes:

Students will be able to

- Understand the integration of complex functions.
- Apply Cauchy‘s integral theorem and Cauchy‘s integral formula.
- Understand singularities of complex functions.
- Evaluate improper integrals of complex functions using Residue theorem.

Unit-III: Laplace Transforms

Definition-Laplace transform of standard functions-existence of Laplace Transform – Inversetransform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function– Second shifting theorem – Dirac‘s delta function – Convolution theorem – Laplace transformof Periodic function. Differentiation and integration of transform – solving Initial value problemsto ordinary differential equations with constant coefficients using Laplace transforms.

Unit Outcomes:

Students will be able to

- Understand the concept of Laplace transforms and find the Laplace transforms of elementary functions.
- Find the Laplace transforms of general functions using its properties.
- Understand Laplace transforms of special functions(Unit step function, Unit Impulse &

Periodic).

- Apply Laplace transforms to solve Differential Equations.

Unit-IV: Fourier series

Determination of Fourier coefficients (Euler‘s) – Dirichlet conditions for the existence of Fourierseries – functions having discontinuity-Fourier series of Even and odd functions – Fourier seriesin an arbitrary interval – Half-range Fourier sine and cosine expansions- typical wave forms -Parseval‘s formula-Complex form of Fourier series.

Unit Outcomes:

Students will be able to

- Understand finding Fourier series expression of the given function.
- Determine Fourier coefficients (Euler‘s) and identify existence of fourier series of the given function.
- Expand the given function in Fourier series given in Half range interval.
- Apply Fourier series to establish Identities among Euler coefficients.
- Find Fourier series of wave forms.

Unit-V: Partial Differential Equations & Applications

Formation of partial differential equations by elimination of arbitrary constants and arbitraryfunctions – Solution of first order PDEs by Lagrange‘s method- Solution of non linear PDEs(Standard forms)-Solution of second order PDEs by Method of separation of variables –Solutions of one dimensional wave equation, one dimensional heat equation under initial andboundary conditions.

Unit Outcomes:

At the end of this unit, the students will be able to

- Form Partial Differential Equations.
- Solve Partial Differential Equations of first order.
- Understand the method of separation of variables.
- Solve applications of Partial Differential Equations.

Text Books:

1. B.S.Grewal , ‒Higher Engineering Mathematics‖, Khanna publishers.
2. Erwin Kreyszig, ‒Advanced Engineering Mathematics‖, Wiley India

Reference Books:

1. B.V.Ramana, ‒Higher Engineering Mathematics‖, Mc Graw Hill publishers.
2. Alan Jeffrey, ‒Advanced Engineering Mathematics‖, Elsevier.

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	STRENGTH OF MATERIALS – II	2	1	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1	To teach the student with basic concepts for determination of principal stresses and strains in various structural elements.
2	To calculate deflection in beams, column and trusses.
3	To make the student analyze circular shafts subjected to torsion.
4	To Know the effect of eccentricity of load in columns; apply failure criteria to implement in design of structural members.
5	To make the student determine critical loads for columns with different end conditions.

COURSE OUTCOMES:

On Completion of the course, the students will be able to:

1	Understand the principal stresses and principal planes.
2	Determine deflection at any point on a beam under simple and combined loads
3	Analyze members under torsion, deformation in springs
4	Understand the effect of eccentricity of load in columns and apply failure criteria to implement in design of structural members.
5	Compute the crippling load of column with different conditions

UNIT-I

Compound Stresses and Strains:

Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, and its applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain.

SHEAR STRESSES: Derivation of formula for Shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections.

UNIT -II

Deflection of Beams:

Uniform bending – Slope, deflection and radius of curvature – Differential equation for elastic lineof a beam – Double integration and Macaulay‘s methods. Determination of slope and deflection forcantilever and simply supported beams under point loads, U.D.L. uniformly varying load-Mohr‘s theorems – Moment area method – Application to simply supported and overhanging beams-

Analysis of propped cantilever beams under UDL and point loads.

UNIT -III

Torsion:

Theory of pure torsion – Assumptions and Derivation of Torsion formula for circular shaft – Torsional moment of resistance – Polar section modulus – Power transmission through shafts – Combined bending and torsion –. Springs -Types of springs – Deflection of close coiled helical springs under axial pull and axial couple – Carriage or leaf springs.

UNIT -IV

Direct and Bending stresses:

Introduction-eccentric loading – Columns with eccentric loading – Symmetrical columns with eccentric loading about one axis –About two axes – Unsymmetrical columns with eccentric loading – Limit of eccentricity.

Theories of failure:

Maximum Principal stress theory- Maximum shear stress theory- Maximum strain theory- Maximum strain energy theory-Maximum distortion energy theory

UNIT -V

Columns and Struts:

Introduction – Classification of columns – Axially loaded compression members – Euler‘s crippling load theory – Derivation of Euler‘s critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler‘s critical stress – Limitations of Euler‘s theory – Rankine – Gordon formula – Eccentric loading and Secant formula – Prof. Perry‘s formula.

TEXT BOOKS:

1. Mechanics of Materials – Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.

2. Strength of Materials by R.K Rajput, S.Chand& Company Ltd.

3. Strength of Materials by Dr. Sadhu Singh, Khanna Publishers.

REFERENCES:

1) R. K. Bansal, A Text book of Strength of materials, Laxmi Publications (P) Ltd., New Delhi.

2) Strength of Materials, Fourth edition, S.S. Bhavikatti, Vikas Publishing House, Pvt. Ltd.

3) D. S. Parkas Rao Strength of Materials by, Universities Press Pvt Ltd, Hyderabad.

4) Schaum‘s outline series Strength of Materials, Mc Graw hill International Editions.

5) L.S. Srinath, Strength of Materials, Macmillan India Ltd., New Delhi.

6) S. Basavarajaiah and P. Mahadevappa, Strength of Materials in SI units, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2010

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	FLUID MECHANICS	2	1	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1	To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
2	To impart ability to solve engineering problems in fluid mechanics
3	To enable the students measure quantities of fluid flowing in pipes, tanks and channels
4	To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces.
5	To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

COURSE OUTCOMES:

On Completion of the course, the students will be able to:

1	Understand basic characteristics and behavior of fluids
2	Understand concepts of fluid statics, different equipment and their applications
3	Understand fundamentals of fluid kinematics and differentiate types of fluid flows
4	Apply Euler's and Bernoulli's equation to find the characteristics of fluid in motion
5	Apply Energy losses in pipelines and flow characteristics through closed conduits

UNIT -I:

Basic concepts and definitions:

Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; Variation of viscosity with temperature, Newton law of viscosity; Vapor pressure, Boiling point, Surface tension, Capillarity, Bulk modulus of elasticity, Compressibility.

UNIT -II:

Fluid statics:

Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer , U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. Pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclinedsurfaces. Buoyancy and stability of floating bodies.

UNIT -III:

Fluid kinematics:

Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three -Dimensional continuity equations in Cartesian coordinates.

UNIT -IV:

Fluid Dynamics:

Surface and body forces; Equations of motion - Euler‘s equation; Bernoulli‘s equation – Derivation; Energy Principle; Practical applications of Bernoulli‘s equation : Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;

UNIT -V:

Analysis Of Pipe Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length – Pipes in Parallel and Series.

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi
3. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.

REFERENCES:

1. Fluid Mechanics and Hydraulic Machines, S.C.Gupta, Pearson publication
2. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill
3. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
4. K. Subramanya, Open Channel flow, Tata Mc.Grawhill Publishers.

6. S K SOM and G Biswas, –Introduction to Fluid Mechanics and Fluid Machines‖, Tata McGraw Hill,New Delhi

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B.Tech (R-19 Civil Engineering)

Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	SURVEYING	2	1	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1	To make the student to get well conversant with the fundamentals of various basic methods and instruments of surveying.
2	To introduce to the students in identifying reduced level of the ground and its profile for finding areas and volumes of embankments and cuttings
3	To make the student to use angular measuring instruments for horizontal and vertical control.
4	To enable the student to set simple horizontal curves
5	To introduce the knowledge construction surveys and usage of modern instrumentsuch as total station

COURSE OUTCOMES:

On Completion of the course, the students will be able to:

1	Calculate angles, distances and levels
2	Identify data collection methods and prepare field notes
3	Understand the working principles of survey instruments
4	understand the basics and elements of different types ofcurves on roads and surveying applications in setting out of curves
5	Understand modern techniques in the survey systems.

UNIT – I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying. Measurement of Distances and Directions Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, indirect methods- optical methods- E.D.M. method.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip.

Plane table surveying: Introduction, accessories, setting up of plane table, techniques, testing, adjustments, errors, advantages and disadvantages.

UNIT - II

Levelling - Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes: Areas - Determination of areas consisting of irregular boundary and regular boundary, Planimeter. Volumes - Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Gale‘s traverse table, Omitted measurements.

UNIT - IV

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Curves: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves.

UNIT - V

Construction surveys: Introduction-staking out buildings-Pipelines and sewers-Highways-Culverts. Bridge surveys-Determining the length of a bridge-Locating Centres of piers- Surface surveys and tunnel alignment-Underground surveys-connection of surface and underground surveys-Leveling in tunnels.

Total station Surveying: Basic principles, applications, comparison with conventional surveying. Electromagnetic wave theory - Electromagnetic distance measuring system - Principle of working and EDM instruments.

Text Books:

1. S.S Bhavikatti, ―Surveying theory and Practice‖, 2nd edition, Dreamtech press, Wiley distributors.
2. C.Venkatramaiah, ‒Text book of surveying‖, 2nd edition, Universities press, 2018
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain,‒Surveying‖ (Vol – 1, 2 & 3), - Laxmi Publications (P) ltd., New Delhi

References:

1. Arthur R Benton and Philip J Taety, ‒Elements of Plane Surveying‖, McGraw Hill – 2000.
2. Arora K R ‒Surveying‖ Vol 1, 2 & 3, Standard Book House, Delhi, 2004.
3. Chandra A M, ‒Plane Surveying‖, New Age International Pvt. Ltd., New Delhi, 2002.

4. Bhavikatti –Surveying‖ Vikas publishing house ltd.
5. S K Duggal, –Surveying‖ (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
6. R. Agor Khanna Publishers 2015 –Surveying and leveling‖.
7. R. Subramanian, –Surveying and levelling‖ Oxford university press, New Delhi.
8. Chandra A M, –Higher Surveying‖, New age International Pvt. Ltd., Publishers, New Delhi, 2002.
9. S.S Bhavikatti –Surveying and Levelling‖, Vol. 1 and 2, Dreamtech press, Wiley distributors.
10 .Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System – –Theory and Practice‖, Springer -Verlag Publishers, 2001.

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	ENGINEERING GEOLOGY	2	0	0	2

COURSE OBJECTIVES

The objectives of this course are:

1	Type of rocks ,civil engineering importance of rock forming minerals.
2	Geological structures, reasons of formation for each type and their side effects on the engineering projects
3	.Study ground water, factors affecting on the variation of water table depth methods of searching for ground water.
4	Study the geophysical investigation methods
5	Study the dams and geology of dam site.

COURSE OUTCOMES:

On Completion of the course, the students will be able to:

1	Understand principles of engineering geology.
2	Understand properties of various rocks and minerals
3	Understand the suitability of sites for various civil engineering structures
4	Understand geological strata in the analysis and design the civil engineering structures.
5	Understand the concept of remote sensing and GIS

UNIT – I

INTRODUCTION:

Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS: Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like ‑Granite‖

MINERALOGY:

Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other

common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT – II

PETROLOGY:

Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

STRUCTURAL GEOLOGY:

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults un conformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT – III

GROUND WATER, EARTH QUAKE & LAND SLIDES:-

Groundwater, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT –IV

GEOPHYSICAL STUDIES:-

Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and geothermal method. Special importance of Electrical resistivitymethods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

UNIT – V

GEOLOGY OF DAMS, RESERVOIRS AND TUNNELS:

Types of dams and importance of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (

ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

1) Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005

2)Engineering geology by Duggal, TMH Publishers.

3) Engineerring Geology by Vasudev Kanthi, Universities press, Hyderabad.

REFERENCES:

1. Engineerring geology by Prabinsingh, KatsonPubilcations
2. Engineering Geology by SubinoyGangopadhyay, Oxford University press.
3. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications
4. K. S. Valdiya, ― Environmental Geology‖,, Tata Mc Grew Hills.

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COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)
Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	STRUCTURAL ANALYSIS – I	2	1	0	3

COURSE OBJECTIVES:
The objectives of this course are:

1	Ability to understand the concepts of energy theorems.
2	Ability to analyse whether a structures is statically determinate or in-determinates.
3	Ability to analyse indeterminate structure with yielding of supports
4	Ability to Analyze the beams and frames by using slope deflection distribution method
5	Ability to Analyze the beams and frames by using moment distribution method

COURSE OUTCOMES:
On Completion of the course, the students will be able to:

CO1	Apply energy theorems for analysis of indeterminate structures
CO2	Analyse whether a structures is statically determinate or in-determinates.
CO3	Analyze indeterminate structure with yielding of supports
CO4	Analyze the beams and frames by using slope deflection distribution method
CO5	Analyze the beams and frames by using moment distribution method

UNIT – I

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano‘s first theorem-Deflections of simple beams and pin jointed trusses.

UNIT – II

ANALYSIS OF INDETERMINATE STRUCTURES: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano‘s theorem.

UNIT – III

FIXED BEAMS & CONTINUOUS BEAMS : Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT – IV

SLOPE-DEFLECTION METHOD: Introduction-derivation of slope deflection equations-application to continuous beams with and without settlement of supports - Analysis of single bay portal frames without sway

UNIT – V

MOMENT DISTRIBUTION METHOD: Introduction to moment distribution method-Application to continuous beams with and without settlement of supports-Analysis of single bay storey portal frames without sway.

TEXT BOOKS:

(1) Analysis of Structures – Vol-I&II by V.N.Vazirani&M.M.Ratwani, Khanna Publications, New Delhi.
(2) Structural Analysis by S SBhavikatti – Vikas Publishing House.
(3) Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

REFERENCES :

(1) Structural analysis – Hibbler – Pearson education
(2) Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
(3) Structural Analysis – D.S.Prakasarao - Univeristy press.
(4) Introduction To Structural Analysis-Nautial- New Age Pubilishers
(5) Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, NewDelhi.
(6) Structual analysis Vol.I and II by Dr.R.Vaidyanathan and Dr.P Perumal – Laxmi publications.
(7) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	SURVEYING LAB	0	0	3	1.5

Course Objectives :

1. To find the area of a given boundary through Plane Table Survey and solve two point problem
2. To determine the RLs of different points through fly leveling
3. To draw longitudinal and cross sections of Road profile
4. To determine the horizontal & vertical angles with a Theodalite and find heights and distances via Tachometry
5. To determine areas and remote heights using total station traversing

List of Experiment :

- Setting up of Right angles using cross staff
- Plane table survey; finding the area of a given boundary
- Two Point Problem by the plane table survey.
- Fly leveling: Height of the instrument method and rise and fall method.
- Fly leveling: Longitudinal Section and Cross sections of a given road profile.
- Theodolite Survey: Determining the Horizontal and Vertical Angles
- Finding the distance between two inaccessible points using Theodolite
- Tachometric survey: Heights and distance problems using tachometric principles.
- One Exercise on Curve setting.
- Total Station Determination of area using total station. Traversing and Contouring
- Total Station: Determination of Remote height.
- Developing a Contour map

COURSE OUTCOMES:

On Completion of the course, the students will be able to:

1. Conduct Plane Table Survey and determine areas and be able to solve two point problem
2. Perform fly leveling and determine RLs of different locations and draw contour maps
3. Able to use fly Levels and draw Longitudinal and Cross section profiles of Roads
4. Perform Theodalite survey and measure horizontal & vertical angles and compute heights and distances through Tachometry
5. Able to handle Total Station for complete survey of a given Topography

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	ENGINEERING GEOLOGY LAB	0	0	3	1.5

COURSE OBJECTIVES

The objectives of this course are:

1. Enable the students to understand physical properties of minerals and identify the same
2. Familiarize the students with different igneous rocks & their properties and enable them to identify igneous rocks
3. Familiarize the students with different sedimentary rocks & their properties and enable them to identify such sedimentary rocks
4. Teach physical properties of different metamorphic rocks & their properties and enable them with skills to identify metamorphic rocks.
5. Drawing sections for geological maps showing tilted beds, faults, uniformities etc., and solve Simple Structural Geology problems.

COURSE OUTCOMES

1. Identify the minerals based on their physical properties by simple tests
2. Understand the physical properties of igneous, sedimentary and metamorphic rocks
3. Classify rocks using basic geologic classification systems.
4. Interpret the geological structures in the geological maps and sections.
5. Solve various geological problems involving strike and Dip.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

Text Books:-

1. Elementary Exercises in Geology by CVRK Prasad, Universities press.
2. B.S.Satyanarayana Swamy, Engineering Geology Laboratory Manual , Dhanpat Rai Sons, New Delhi

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Semester-3 Syllabus

SubjectCode	TitleoftheSubject	L	T	P	C
	Exploratory Data Analysis Lab	0	0	3	1.5

COURSEDESCRIPTION: Statistical and Numerical Techniques– Measures of centra tendency/dispersion, Curve fitting by method of least squares, linear regression and correlation, ANOVA; Data analysis using R, Numerical Solution of algebraic, transcendental and ordinary differential equations ,Inverse and Eigen values of a matrix– Numerical method.

CEO 1: To impart knowledge on the application of Statistical and Numerical techniques – Analysis of data, solution of algebraic, transcendental and differential equations, Matrices, transformation from time domain to frequency domain.
CEO 2: To develop skills in analyzing the data using appropriate statistical tools, solvingalgebraic and differential equations, matrices using appropriate numerical methods, obtaining amplitude and frequency of a time signal

COURSE OUTCOMES: After completion of the course, a successful

student is able to

CO1 : Develop skills in designing appropriate statistical method for (a) Determining the measures of central tendency/dispersion. (b) Box plot representation using Origin Software. (c) Finding a best fit curve to a given set of data. (d) Determining the coefficient of correlation and linear regression.
CO2:Develop skills in using suitable statistical technique for (a) Analyzing variance(ANOVA)for one variable. (b) Determination of R function for a given set of data and appropriate interpretation. (c) Representing three dimensional data in contour plot using MATLAB.
CO 3 : Transform a time signal / pulse to a frequency domain using concepts of Fourier series

CO 4 : Develop skills using suitable numerical technique for
(a) Solving algebraic ,transcendental and differential equations.
(b) Determining Eigen Values and dominant Eigen value of a matrix.

LISTOFEXPERIMENTS

Required softwares :SPSS,ORIGIN, MATLAB,R-LAB,MSOFFICE2010.

I. Statistical and Fourierseries Techniques:

To a given set of data:

1. Determine measures of central tendency/dispersion - Mean, Median, Mode, Range and Variance; Box plot representation using Origin Software.
2. Fit a straight line, parabola, exponential curve.
3. Determine the coefficient of correlation and regression.
4. Analysis of variance(ANOVA)for one variable.
5. Determine R function and give interpretation.
6. Transforming signal in time domain into frequency domain.
7. Represent in contour plot using MATLAB.

II. Numerical Techniques:

8. Solving algebraic and transcendental equations using Regula - Falsi and Newton – Raphson methods.
9. Determine the inverse of a matrix; solving system of algebraic equations using Gauss-Siedal method.
10. Determine the Eigen values of a matrix and dominant Eigen value by power method.
11. Numerical differentiation and integration.
12. Numerical solution of Ordinary differential equations - Modified Eulermethod & R-Kfourth order method.

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
-	**Environmental Science**	3	0	0	0

OBJECTIVE: To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

UNIT – I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: – Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II

ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution

c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

SOLID WASTE MANAGEMENT : Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK : Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

TEXT BOOKS :

(1) Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, Universities Press.
(2) Environmental Studies by Palaniswamy – Pearson education
(3) Environmental Studies by Dr.S.AzeemUnnisa, Academic Publishing Company

REFERENCES :

(1) Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Pubilications.
(2) Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
(3) Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
(4) Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
(5) A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Pubilishing House
(6) Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	STRUCTURAL ANALYSIS – II	2	1	0	3

COURSE OBJECTIVE:
The objectives of this course are:

1	Ability the behaviour of arches and their methods of analysis
2	To ability various classical methods for analysis of indeterminate structures
3	Ability to Analyze the beams and frames using Kani's method
4	To ability Analyze the beams and frames by using Flexibility Matrix method
5	Ability to Analyze the beams and frames by using Stiffness Matrix method

COURSE OUTCOMES:
On Completion of the course, the students will be able to:

1	Demonstrate the behaviour of arches and their methods of analysis
2	Analyze the frames by moment distribution method and substitute frame analysis
3	Analyze the beams and frames using Kani's method
4	Analyze the beams and frames by using Flexibility Matrix method
5	Analyze the beams and frames by using Stiffness Matrix method

UNIT I
ARCHES : Three hinged and Two hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature-Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses.
UNIT-II
MOMENT DISTRIBUTION METHOD FOR FRAMES:-Analysis of single bay single storey portal frame including side sway –Substitute frame analysis by two cycle method.
UNIT – III
KANI`S METHOD:-
Analysis of continuous beams with and without settlement of supports -Single bay single storey portal frames with and without side sway.
UNI T – IV
FLEXIBILITY METHOD :-
Flexibility methods- Introduction- Application to continuous beams including support settlements— Analysis of Single bay single storey portal frames without and with side sway.
UNIT – V
STIFFNESS METHOD:
Stiffness methods- Introduction-application to continuous beams including support settlements- Analysis of Single bay single storey portal frames without and with side sway.

TEXT BOOKS:

1. Analysis of structures by Vazrani&Ratwani – Khanna Publications.
2. Theory of structures by Ramamuratam, jain book depot , New Delhi.

REFERENCES :

1. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.
2. Basic Structural Analysis by K.U.Muthu*et al.*,I.K.International Publishing House Pvt.Ltd
3. Theory of Structures by Gupta S P, G S Pundit and R Gupta, Vol II, Tata McGrawHill Publications company Ltd.
4. D S Prakash Rao, **"Structural Analysis: A Unified Approach"**, Universities Press

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	Building Planning and Drawing	2	1	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1	Understand basic principles of building design and planning.
2	Comprehend local building bye-laws and provisions of National Building Code in respect of building and town planning
3	They will explore building drawing as a way of discovering and developing ideas for designing residential , commercial and public buildings.
4	The student develops basic drawing skills; create multilayer architectural and prepare working drawings, foundation plans and other executable drawings with proper details for residential buildings
5	Explain the principles of planning and design considerations to construct earthquake resistant building

COURSE OUTCOMES

On Completion of the course, the students will be able to:

1	Apply the principles and bye-laws in planning Residential buildings
2	Understand the planning of residential building & public building
3	Understand the safety and comforts in building
4	Interpret the symbols, signs and conventions from the given drawing.
5	Draw a line sketch and planning and bi section of a building.

PART-A

UNIT -I

PLANING OF BUILDINGS: Types of buildings, Types of residential buildings, site selection for residential building, orientation of buildings; aspect; prospect; privacy; furniture requirement e;grouping;circulation;sanitation;lighting;ventilation;cleanliness;flexibility;elegancy;Economy; practical considerations.

BUILDING BYELAWS AND REGULATIONS: Introduction- Terminology ;Objectives of building byelaws; Minimum plot sizes; Open space requirements ;Plinth area, floor area, carpet area; Floor area ratio (FAR), Floor space Index (FSI) ;areas for different units; Principles underlying building byelaws ; built up area limitations – Height of Buildings ,Wall thickness, lighting and ventilation requirement, safety from fire, drainage and sanitation; applicability of the bye-laws.

UNIT –II

PLANNING OF RESIDENTIAL BUILDINGS: Minimum standards for various parts of buildings– Requirements of different rooms and their grouping – Characteristics of various types of residential buildings

PLANNING OF PUBLIC BUILDING: Planning of Educational institutions, Hospitals, Office buildings, Banks, Industrial buildings, Hotels and Motels, Hostels, Bus Station.

UNIT -III

BUILDINGS: SAFETY AND COMFORT: Aspects of safety-Structural, health, fire and constructional safety. Components of building automation system - HVAC, electrical lighting, Security, fire-fighting, communication etc. design for thermal comfort, ventilation comfort, air conditioning comfort, lighting comfort, noise and acoustic comfort.

PART-B

UNIT -IV

SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, and white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond; odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

DOORS WINDOWS, VENTILATORS AND ROOFS: Paneled Door – Paneled and glazed door; glazed windows – Paneled windows; Swing ventilator – Fixed ventilator; Couple roof – Collar roof; Kind Post truss – Queen post truss.

UNIT –V

Given line diagram with specification to draw plan, section and elevation of the following :

1. Residential Building
2. Hospital
3. Schools
4. Post office
5. Corporate Office Building
6. Hotels
7. Bank buildings
8. Bus stations
9. Industrial buildings

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part- A and Part-B. Part- A consists of three questions with either or choice from three units in planning portion .Each question carries 10 marks. Total marks for Part-A is 30 marks. Part- B consists of two questions with either or choice from drawing portion. Question from unit-IV carries 10 marks and question from unit-V carries 30 marks. Total marks for Part-B is 40 marks.

TEXT BOOKS:

1. Planning and Designing and Scheduling – Gurucharan Singh and Jagadish Singh- Standard publishers.
2. Building Planning and Design – N.Kumara Swamy and A.Kameswara Rao. Charotar publications.

REFERENCES:

1. Building by laws by state and Central Governments and Municipal corporations. National Building Code
2. Building drawing with an integrated approach to building environment-M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc Graw Hill

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	HYDRAULICS AND HYRAULIC MACHINERY	2	1	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1	To Introduce concepts of laminar and turbulent flows
2	To teach principles of uniform and non-uniform flows through open channel.
3	To impart knowledge on design of turbines.
4	To impart knowledge on design of pumps.
5	To impart knowledge on design of multistage pumps

COURSE OUTCOMES:

On Completion of the course, the students will be able to:

1.	Understand characteristics of laminar and turbulent flows.
2.	Understand different formulae on open channel flow and design open-channel flow systems
3.	Understand the concepts of varying flow in pipes and Measure discharge and velocity
4.	Understand hydrodynamic force of jets different vanes and design Pelton wheel, Francis and Kaplan turbine
5.	Understand principles of centrifugal pumps and Calculate losses and efficiencies of centrifugal pumps

UNIT -I:

Laminar & Turbulent flow in pipes:

Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke‘s law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody‘s diagram – Introduction to boundary layer theory.

UNIT -II:

Uniform flow in Open Channels:

Open Channel Flow - Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow,

Velocity Distribution of channel section. Hydraulically efficient channel sections**:** Rectangular, trapezoidal and triangular channels, Energy and Momentum correction factors.

UNIT III:

Non-Uniform flow in Open Channels:

Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics- Energy

dissipation.

UNIT -IV:

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Velocity triangles at inlet and outlet - Work done and efficiency

Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design - efficiency - Draft tube: theory - characteristic curves of hydraulic turbines. Cavitation: causes and effects.

UNIT -V:

Pumps:

Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies .

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2. K. Subramanya, Open channel Flow, Tata McGraw Hill.

REFERENCES:

1. Rajput, Fluid mechanics and fluid machines , S. Chand & Co
2. D. S. Kumar Fluid Mechanics & Fluid Power Engineering, Kataria& Sons.
3. Srinivasan, Open channel flow by, Oxford University Press
4. Banga & Sharma, Hydraulic Machines, Khanna Publishers.
5. Fluid Mechanics and Hydraulic Machines, S.C.Gupta, Pearson publications,
6. R.K. Bansal, –A Text book of Fluid Mechanics and Hydraulic Machines‖, Laxmi Publications, New Delhi

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	ESTIMATION, COSTING AND VALUATION	2	1	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1.	To impart basic knowledge on different types of estimation
2.	To enrich with specifications and tender procedures.
3.	To give insights on various types of contract agreements.
4.	To inculcate data preparation for abstract estimation
5.	To teach procedure for valuation of buildings.

Course Outcomes:

1.	Apply different types of estimates for different building elements
2.	Formulate specifications and tender documents.
3.	Prepare contract agreements
4.	Determine rate analysis of different items.
5.	Understand the Valuation of buildings.

UNIT -I:

Estimation

Methods of estimation-advantages-types of estimates-Detailed estimates of residential buildings-Single storied and multi-storied buildings-Earthwork-foundations-Super structure-Fittings including sanitary and electrical fittings-Paintings.

UNIT -II:

Specifications and Tenders

Specifications-Detailed and general specifications-Construction specifications-sources - Types of specifications-Tender notices-types-corrigendum notice-Tender procedures Drafting model tenders.

UNIT -III:

Contracts

Types of contracts-Formation and conditions of contract-Problems-contract for labor, material, design and construction-Drafting of contract documents-Construction contracts- Arbitration and legal requirements.

UNIT -IV:

Rate Analysis and Preparation of Bills

Data-Rate analysis-abstract estimate-Report to accompany estimate-measurement book –Bills-Types

UNIT -V:

Valuation

Principles of valuation-Value and Cost-Value engineering-Value analysis-Phases in value engineering-Information-Function-escalation-Evaluation-Recommendation-Implementation-Audit.

TEXT BOOKS:

1. Dutta, B. N., ‒Estimating and Costing in Civil Engineering (Theory & Practice)‖, UBS Publishers, 2016
2. B. S. Patil, ‒Civil Engineering Contracts and Estimates‖, Universities Press Pvt Ltd, Hyderabad. 4th Edition 2015.

REFERENCES:

1. M. Chakraborthi, ―Estimation, Costing and Specifications‖, Laxmi publications.
2. D. D. Kohli & R. C. Kohli, ‒A Textbook of Estimating and Costing(Civil)‖, S. Chand and Company Limited, New Delhi
3. Standard Schedule of rates and standard data book by public works department.
4. I. S. 1200 (Parts I to XXV, ‒Method of Measurement of Building and Civil Engineering works – B.I.S.)‖ 1974.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::ANANTAPURAMU

DEPARTMENT OF MECHANICAL ENGINEERING

II Year B.Tech. II-Sem

NUMERICAL METHODS AND PROBABILITY THEORY

(Common to CIVIL, MECHANIACAL & CHEMICAL)

L	T	P	C
3	0	0	3

Course Objective:

This course aims at providing the student with the knowledge on

- Various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations.
- The theory of Probability and random variables.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO 1 : Acquire knowledge in basic concepts such as

a. Number theory.
b. Congruences and its properties.
c. Divisibility tests.
d. Finite fields.
e. Cryptology.

CO 2 Develop skills in analyzing the

a. Representation of integers and its application in computer science.
b. Linear congruences.
c. Pseudo primes
d. Factorization and factor bases.
e. Key management in cryptography.

CO 3 Develop skills in designing mathematical models for

a. Problems on prime numbers.
b. Linear congruences
c. The sum and number of divisors of a given integer.
d. Finding factorization of the given integer.
e. Different encryption mechanisms.

CO 4 Develop analytical skills in solving the problems involving

a. CGD, factorization of integer, linear Diophantine equations.
b. System of linear congruences
c. Storage and hash functions.
d. Quadratic residues.
e. Various public key cryptography algorithms.

CO 5 Use relevant mathematical technique for evaluating

a. Factorization of integers.
b. Solution for the given system of linear congruences.
c. Cipher text using different named algorithms such as RSA, Public –key cryptography, discrete logarithm, knapsack

ciphers etc.

Course Outcome	Program Outcomes												Program Specific Outcomes				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	1	-	-	-	1	-	-	2	1	-	-					
CO2	1	3	-	-	-	1	-	-	2	2	-	-					
CO3	1	3	2	-	-	1	-	-	2	2	-	-					
CO4	1	1	1	3	-	1	-	-	2	1	-	-					
CO5	1	1	1	1	-	1	-	-	2	1	-	-					

Correlation Levels: High - 3 Medium – 2 Low - 1

Unit-I: Solution of Algebraic & Transcendental Equations:

Introduction-Bisection method-Iterative method-Regula falsi method-Newton Raphson methodSystem of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

Unit Outcomes:

Students will be able to

- Calculate the roots of equation using Bisection method and Iterative method.
- Calculate the roots of equation using Regula falsi method and Newton Raphson method.
- Solve the system of algebraic equations using Gauss Jordan method and Gauss Siedal method.

Unit-II: Interpolation

Finite differences-Newton's forward and backward interpolation formulae – Lagrange'sformulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

Unit Outcomes:

Students will be able to

- Understand the concept of interpolation.
- Derive interpolating polynomial using Newton's forward and backward formulae.
- Derive interpolating polynomial using Lagrange's formulae.
- Derive interpolating polynomial using Gauss forward and backward formulae.

Unit-III: Numerical Integration & Solution of Initial value problems to Ordinary differential equations

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 RuleNumerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard'sMethod of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.

Unit Outcomes:

Students will be able to

- Solve integral equations using Simson's 1/3 and Simson's 3/8 rule.
- Solve integral equations using Trapezoidal rule.
- Solve initial value problems to ordinary differential equations using Taylor's method.
- Solve initial value problems to ordinary differential equations using Euler's method and

Runge Kutta methods.

Unit-IV: Probability theory:
Probability, probability axioms, addition law and multiplicative law of probability, conditionalprobability, Baye's theorem, random variables (discrete and continuous), probability densityfunctions, properties, mathematical expectation.

Unit Outcomes:
Students will be able to

- Understand the concept of Probability.
- Solve problems on probability using addition law and multiplication law.
- Understand Random variables and probability mass and density functions.
- Understand statistical constants of random variables.

Unit-V: Random variables & Distributions:
Probability distribution - Binomial, Poisson approximation to the binomial distribution andnormal distribution-their properties-Uniform distribution-exponential distribution

Unit Outcomes:
Students will be able to

- Understand Probability distribution function.
- Solve problems on Binomial distribution.
- Solve problems on Poisson distribution.
- Solve problems on Normal distribution.

Text Books:
1. B.S.Grewal, "Higher Engineering Mathematics", Khanna publishers.
2. Ronald E. Walpole "Probability and Statistics for Engineers and Scientists", ,PNIE.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:
1. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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B.Tech (R-19 Civil Engineering)
Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	WATER RESOURCES ENGINEERING-I	3	0	0	3

COURSE OBJECTIVE:

The objectives of this course are:

1	Understand the concept of hydrology and components of hydrologic cycle such as precipitation, infiltration, evaporation and transpiration
2	Quantify runoff and use concept of unit hydrograph
3	Demonstrate different methods of irrigation, methods of application of water and irrigation procedure
4	Know the concepts for analysis and design principles of storage and diversion works.
5	Learn design principles of canal structures

COURSE OUT COMES

On Completion of the course, the students will be able to:

1	Understand the various processes of hydrologic cycle, measurement of rainfall and analyze the rainfall data.
2	Estimate the rainfall data from hydrograph analysis and classify the geological formation of ground water
3	Understand the process of irrigation and water requirement of crops
4	Understand various aspects related to Canal-silt theories, water logging and design of canal lining.
5	Understand the different types of cross drainage work

UNIT – I

INTRODUCTION TO HYDROLOGY: Engineering hydrology and its applications; Hydrologic cycle; precipitation- Types and forms, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, presentation and interpretation of rainfall data.

DESCRIPTIVE HYDROLOGY: Evaporation- Factors affecting evaporation, measurement of evaporation; Infiltration- Factors affecting infiltration, measurement of infiltration, infiltration indices; Run off- Factors affecting run- off, Computation of run-off; Design Flood; Estimation of maximum rate of run-off; separation of base flow.

UNIT – II

HYDROGRAPH ANALYSIS: Hydrograph; Unit Hydrograph- Construction and limitations of Unit hydrograph, Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; S-hydrograph.

GROUND WATER: Introduction; Aquifer; Aquiclude; Aquifuge; aquifer parameters- porosity, Specific yield, Specific retention; Divisions of sub–surface water; Water table; Types of aquifers; storage coefficient-coefficient of permeability and transmissibility

UNIT – III

IRRIGATION: Introduction; Necessity and Importance of Irrigation; advantages and ill effects of Irrigation; types of Irrigation; methods of application of Irrigation water; quality for Irrigation

water. Duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty.

WATER REQUIREMENT OF CROPS: Types of soils, Indian agricultural soils, preparation of land for Irrigation; soil fertility; Soil-water-plant relationship; vertical distribution of soil moisture; soil moisture tension; soil moisture stress; various soil moisture constants; Limiting soil moisture conditions; Depth and frequency of irrigation; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; Kor depth and Kor period; crop seasons and crop rotation; Irrigation efficiencies; Determination of irrigation requirements of crops; Assessment of Irrigation water. Consumptive use of water-factors affecting consumptive use, direct measurement and determination by use of equations (theory only)

UNIT – IV

CHANNELS – SILT THEORIES: Classification; Canal alignment; Inundation canals; Cross–section of an irrigation channel; Balancing depth; Borrow pit; Spoil bank; Land width; Silt theories–Kennedy‘s theory, Kennedy‘s method of channel design; Drawbacks in Kennedy‘s theory; Lacey‘s regime theory- Lacey‘s theory applied to channel design; Defects in Lacey‘s theory; Comparison of Kennedy‘s and Lacey‘s theory.

WATER LOGGING AND CANAL LINING: Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – Necessity, advantages and disadvantages; Types of lining; Design of lined canal.

UNIT – V

DIVERSION HEAD WORKS: Types of diversion head works; Diversion and Storage head works; weirs and barrages; Layouts of diversion head works; components; Causes and failure of hydraulic structures on pereable foundations; Blighs creep theory; Khoslastheory; Determination of uplift pressure, impervious floors using Blighs and Khoslas theory; Exit gradient.

TEXT BOOKS:

1. Irrigation and water power engineering by Punmia& Lal, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:

1. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, Delhi
2. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
3. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.

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B.Tech (R-19 Civil Engineering)
Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	UNIVERSAL HUMAN VALUES	2	1	0	2

(Common to all)

Introduction:

This course discusses the role of human values in one‘s family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one

more semester for which the foundation course names as‖H-102 Universal Human Values 2 : –Understanding Harmony‖ is designed which may be covered in their III or IV Semester.

In the Induction Program, students would get an initial exposure to human valuesthroughUniversalHumanValues–I.Thisexposureistobeaugmentedby this compulsory full semester foundation course.

Course Objective:

The objective of the course is four fold:

1.	Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2.	Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3.	Strengthening of self-reflection.
4.	Development of commitment and courage to act.

Unit 1:
Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

- Purpose and motivation for the course, recapitulation from Universal HumanValues-I
- Self-Exploration–what is it? - Its content and process; _Natural Acceptance‘ and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for

fulfilment of aspirations of every human being with their correct priority

- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

Unit 2:

Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as a co-existence of the sentient _I' and the material _Body'
- Understanding the needs of Self (_I') and _Body' - happiness and physical facility
- Understanding the Body as an instrument of _I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of _I' and harmony in _I'
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal ofPhysical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam andHealth.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Unit 3:

Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation;the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Unit 4:

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
- Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film ‒Home‖ can be used), pollution, depletion of resources and role of technology etc.

Unit 5:
Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems

- Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
- Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Text Book

1. R R Gaur, R Asthana, G P Bagaria, ‒A Foundation Course in Human Values and Professional Ethics‖, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, ‒Teachers‘ Manual for A Foundation Course in Human Values and Professional Ethics‖, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books

1. JeevanVidya: EkParichaya, ANagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. A.N.Tripathi, ‒HumanValues‖, NewAgeIntl.Publishers,NewDelhi,2004.
3. The Story of Stuff(Book).
4. MohandasKaramchandGandhi ‒TheStoryofMyExperimentswithTruth‖
5. E. FSchumacher. ‒Small is Beautiful‖
6. SlowisBeautiful –CecileAndrews
7. J C Kumarappa ‒Economy of Permanence‖
8. PanditSunderlal‒Bharat Mein Angreji Raj‖
9. Dharampal, ‒Rediscovering India‖
10. Mohandas K.Gandhi, ‒Hind Swaraj or Indian Home Rule‖
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland(English)
13. Gandhi - Romain Rolland (English)

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
-	**Computer Aided Drafting Lab**	0	0	3	1.5

Course outcome / Course Objectives:

1. After completion of the course A student will able to know how to apply engineering drawing using computers
2. A student can understand about the scope of Auto CAD software
3. A student will know what is plan and how it should drawn in auto CAD software.

LIST OF EXERCISES:

1. Introduction to computer aided drafting
2. Software for CAD – Introduction to different software_s
3. Practice exercises on CAD software
4. Drawing of plans of buildings using software for Single storied buildings
5. Drawing of plans of buildings using software for multi storied buildings
6. Developing sections and elevations for Single storied buildings
7. Developing sections and elevations for multi storied buildings
8. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software
9. Exercises on development of working of buildings

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	FLUID MECHANICS AND HYDRAULIC MACHINERY LAB	0	0	3	1.5

Course Objective:

By the end of this course student will be able

1. To determine coefficient of discharge for Venturimeter and orifice meter.
2. To determine coefficient of discharge for small orifice and mouth piece
3. To determine discharge co-efficient of Notches
4. To determine the efficiency of Pelton wheel Turbine and centrifugal pump
5. To evaluate impact of jets on vanes in different angles

COURSE OUTCOMES	
CO1	1. Perform flow tests and determine coefficient of discharge for venturimeter and orifice meters
CO2	2. Conduct flow tests and determine Coefficient of discharge for a small orifice and external mouthpiece.
CO3	3. Perform tests on rectangular & triangular notches and evaluate flow regimes
CO4	4. Evaluate the efficiency of Pelton wheel turbine and centrifugal pumps
CO5	5. Conduct impact of jets test on Vanes located in different angles and draw velocitytriangles

SYLLABUS:

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Verification of Bernoulli‘s equation.

8. Impact of jet on vanes.
9. Study of Hydraulic jump.
10. Performance test on Pelton wheel turbine.
11. Performance test on Francis turbine.
12. Efficiency test on centrifugal pump.

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	BIOLOGY FOR ENGINEERS	3	0	0	0

Course Objectives: To provide basic understanding about life and life Process. Animal an plant systems. To understand what bi molecules, are, their structures are functions. Application of certain bi molecules in Industry.

1	Brief introduction about human physiology and bioengineering.
2	To understand hereditary units, i.e. DNA (genes) and RNA and their synthesis in living organism.
3	How biology Principles can be applied in our daily life using different technologies.
4	Brief introduction to the production of transgenic microbes, Plants and animals.

Course Outcomes:
After studying the course, the student will be able to:

1	Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
2	Explain about bio molecules, their structure and function and their role in the livingorganisms. How bio molecules are useful in Industry.
3	Briefly about human physiology.
4	Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
5	Know about application of biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes ,plants andanimals.

Unit I: Introduction to Basic Biology
Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification.

Unit Outcomes:
After completing this unit, the student will be able to
- Summarize the basis of life. (L1)
- Understand the difference between lower organisms (prokaryotes) from higher organisms (eukaryotes). (L2)
- Understand how organisms are classified. (L3)

Unit II: Introduction to Bio molecules
Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Unit Outcomes:

After completing this unit, the student will be able to

● Understand what are biomolecules? their role in living cells, their structure, function and how they are produced. (L1)

● Interpret the relationship between the structure and function of nucleic acids. (L2)

● Summarize the applications of enzymes in industry. (L3)

● Understand what is fermentation and its applications of fermentation in industry. (L4)

Unit III: Human Physiology

Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

Unit Outcomes:

After completing this unit, the student will be able to

● Understand what nutrients are (L1)

● Understand the mechanism and process of important human functions (L2 & L3)

Unit IV: Introduction to Molecular Biology and recombinant DNA Technology

Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. DNA technology. Introduction to gene cloning.

Unit Outcomes:

After completing this unit, the student will be able to

● Understand and explain about gene structure and replication in prokaryotes and Eukaryotes (L1)

● How genetic material is replicated and also understands how RNA and proteins are synthesized. (L2)

● Understand about recombinant DNA technology and its application in different fields.(L3)

● Explain what is cloning. (L4)

Unit V: Application of Biology

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

Unit Outcomes:

After completing this unit, the student will be able to Understand.

□ How biology is applied for production of useful products for mankind.(L1)

□ What are biosensors, biochips etc. (L2)

□ Understand transgenic plants and animals and their production (L3)

Text books:

1. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications -

2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

Reference Books:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, –Biology: A Global Approach‖, Pearson Education Ltd, 2018.

2. T Johnson, Biology for Engineers, CRC press, 2011

3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed..Panima Publications. PP 434.

4. David Hames, Instant Notes in Biochemistry –2016

5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology –-2014

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B.Tech (R-19 Civil Engineering)
Semester-5 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	DESIGN OF REINFORCED CONCRETE STRUCTURES	2	1	0	3

COURSE OBJECTIVES

The objectives of this course are:

1.	To teach the students about the design of reinforced concrete beam, column, slab, footing and retaining wall
2.	To enable the students to understand the various design philosophies based on both working stress and limit state methods.
3.	To enhance competence in design of reinforced concrete structures.
4.	To understand the concepts of designing reinforced cement concrete structures.
5.	To familiarize the students with the concepts of designing concrete mixes using different methods of proportioning and to understand the effects of various parameters

COURSE OUTCOMES

On Completion of the course, the students will be able to:

1	Classify the basic concepts of reinforced concrete analysis and design.
2	Classify the behaviour and various modes of failure of reinforced concrete members.
3	Design of Short and Long columns
4	Design of different types of footings
5	Design of slabs and staircase.

UNIT- I:

Introduction:

Concepts of Reinforced concrete Design – Introduction to Working Stress Method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS – 456:2000. **Beams:** Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections

UNIT -II:

Shear and torsion:

Limit state analysis and design of section for shear and torsion – Concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing;

UNIT -III:

Columns:

Short and Long columns – Under axial loads, Uniaxial bending and biaxial bending – I S Code provisions.

UNIT -IV:

Footings:

Different types of footings – Design of isolated, square, rectangular, circular footings and combined footings.

UNIT- V:

Slabs & Stair Case:

Design of one-way slab, Two-way slabs and continuous slab using I.S. Coefficients Limit state design for serviceability for deflection, cracking and codal provision. Design of doglegged staircase.

Codes/Tables: IS 456-2000 and relevant sheets (Pertaining to columns) of SP 16 Code books to be permitted into the examinations Hall.

TEXT BOOKS:

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, –Limit State Design‖, Laxmi, Publications Pvt. Ltd., New Delhi
2. P. C. Varghese, Limit state –designed of reinforced concrete‖, Prentice Hall of India, NewDelhi

REFERENCES:

1. N. Krishna Raju, –Structural Design and Drawing‖, Universities Press Pvt Ltd, Hyderabad. 4rd edition 2020.
2. N. C. Sinha and S. K Roy, –Fundamentals of reinforced concrete‖ , S. Chand publishers
3. N.Subramanian, –Design of Reinforced concrete structures‖, Oxford university press.

I S CODE OF PRACTICE

IS 456- 2000 Code of practice for Reinforced Concrete Structures.

NOTE: Assignment on preparation of drawing sheets showing detailing of various RC Elements

All the designs to be taught in Limit State Method

Following plates should be prepared by the students.

- Reinforcement particulars of T-beams and L-beams.
- Reinforcement detailing of continuous beams.
- Reinforcement particulars of columns and footings.
- Detailing of One way, Two way and continuous slabs

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Semester-5 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	CONCRETE TECHNOLOGY	3	0	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1	To explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy
2	To develop fundamental knowledge in the fresh and hardened properties of concrete
3	To inculcate the testing methodology to evaluate the properties of concrete during fresh and hardened stage
4	To impart the knowledge on the behavior of concrete with response to stresses developed.
5	To impart the knowledge on the special concretes And design a concrete mix which fulfils the required properties for fresh and hardened concrete

COURSE OUTCOMES:

On Completion of the course, the students will be able to:

1	Understand various ingredients of concrete and their role.
2	Examine knowledge on the fresh and hardened properties of concrete.
3	Understand the long term behavior of concrete
4	Design concrete mixes using various methods.
5	Perceive special concretes for accomplishing performance levels.

UNIT – I:

Ingredients of concrete:

Cement-Chemical composition-hydration process-Bogue‘s compound-Tests on properties of cement-Types of cement - I.S. Specifications. Aggregates- Classification of aggregate – Tests on properties of aggregates - characteristics of aggregate - I.S. Specifications. Water-Quality of water - Characteristics of water - I.S. Specifications. Admixtures – Classification of chemical admixtures – Properties and limitations – Classification of mineral admixtures – Properties and limitations - I.S. Specifications.

UNIT – II:

Properties of concrete:

Fresh concrete: Mixing of concrete-Workability-Factors influencing workability- Measurement of workability for conventional concrete (Slump Cone, Compaction Factor and Vee-Bee test) & SCC (V-Funnel, L-Box, U- Box, Slump Flow and J–Ring). **Hardened concrete**: Water/Cement Ratio(Abram‘s Law)-Gel Space Ratio-Tests on hardened concrete-Destructive Tests (Compression, Split Tensile and Flexural)-Semi Destructive Tests (Core Cutter and Pull out test) and Non

Destructive Tests (Rebound Hammer-UPV - Radiological methods) .

UNIT – III:

Elasticity, Shrinkage and Creep:

Curing of concrete -Methods of curing-Effects of improper curing-self curing-Modulus of Elasticity-Poisson's Ratio-Dynamic Modulus of Elasticity- Shrinkage and various types -Factors Affecting Shrinkage-Moisture Movement-Creep of Concrete-Factors Influencing Creep.

UNIT– IV:

Concrete Mix Design:

Proportioning of Concrete Mixes-Factors influencing - Road Note. No. 4 and IS Code Methods- IS 456 provisions on Durability-Quality Control and Statistical Methods – Mix Design of High Strength concrete (using ACI method).

UNIT – V:

Special Concretes:

Light Weight Concretes –Light Weight Aggregate Concrete- Cellular Concrete - No Fines Concrete-High Density Concrete – Fiber Reinforced Concrete-Polymer Concrete-Self Compacting Concrete and its Mix Design using EFNARC guidelines.

Text Books:

1. A. M. Neville,―Properties of Concrete‖, Pearson Publication – 4th Edition
2. M.S. Shetty, A. K. Jain, ―Concrete Technology Theory and Practice‖, S. Chand and Company Limited, New Delhi

References:

1. M. L. Gambhir, ―Concrete Technology‖, Tata Mc. Graw Hill Publishers, New Delhi
2. N. Krishna Raju, ―Design of Concrete Mixes‖, CBS Publishers.
3. P. K. Mehta And J. M. Monteiro, ―Concrete: Micro Structure, Properties and Materials‖ Mc-Graw Hill Publishers
4. J. Prasad, C.G.K. Nair, ―Non-Destructive Test and Evaluation of Materials‖, Tata Mcgraw Hill Publishers, New Delhi

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Semester-5 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	ENVIRONMENTAL ENGINEERING	3	0	0	3

Course Objectives:

The objectives of this course are:

1	To teach requirements of water and its treatment.
2	To impart knowledge on sewage treatment methodologies
3	To impart knowledge on basic concepts about sewerage system
4	To enable with design concepts of wastewater treatment UNITs
5	To throw light on importance of plumbing

COURSE OUTCOMES:

On Completion of the course, the students will be able to:

CO1	Understand about quality of water and purificationprocess
CO2	Select appropriate technique for treatment of waste water.
CO3	Estimate sewage Generation and understand the Characteristics andComposition of sewage
CO4	Understand consequences of solid waste and its management
CO5	Design domestic plumbing systems.

UNIT I:

Water quality and treatment:

Water quality: Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system *Water Treatment:* aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes

UNIT II:

Sewage and Treatment-I

Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage-Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems

UNIT III

Sewage and Treatment-II

Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, Wastewater treatment – COD & BOD-

Aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – Quality requirements for various purposes.

UNIT IV:

Solid Waste Management-

Municipal solid waste-Composition - Chemical and physical parameters - Collection, transport, treatment and disposal. waste from commercial establishments and other urban zones- Construction activities - Biomedical wastes, Effects of solid waste on environment. Disposal of solid waste-Disposal methods- Integrated solid waste management.

UNIT V:

Domestic Plumbing

Types of home plumbing systems for water supply and waste water disposal, high rise building plumbing-Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings. Role of Government authorities in water supply, sewerage disposal.

Text Books:

1. G. S. Birdi,―Water supply and sanitary Engineering‖, Dhanpat Rai & Sons Publishers.
2. Peavy, H.S, Rowe, D. R. Tchobanoglous, –Environmental Engineering‖, Mc-Graw –Hill International Editions, New York 1985.

References:

1. B.C. Punmia, Ashok Jain & Arun Jain, –Water Supply Engineering‖, Vol. 1, Waste water Engineering, Vol. II, Laxmi Publications Pvt. Ltd, New Delhi.

2.MetCalf and Eddy,–Wastewater Engineering‖, Treatment, Disposal and Reuse, Tata McGraw-Hill, New Delhi.

3.S. M. Patil, ―Plumbing EngineeringTheory, Design and Practice‖,1999.

4.K. N. Duggal, ‖Elements of Environmental Engineering‖, S. Chand Publishers.

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COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)
Semester-5 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	GEOTECHNICAL ENGINEERING -I	2	1	0	3

Course Objectives:

The objectives of this course are:

1	To enable the student to find out the index properties of the soils and their classification.
2	To enable the student to determine permeability of soils using various methods , and to understand the concept of seepage of water through soil
3	To concept of seepage of water through soil
4	To enable the students to find understand the difference between compaction and consolidation.
5	To impart knowledge on shear strength and its importance

Course Outcomes:

on completion of the course, the students will be able to:

CO1	Understand soil formation and determine the index properties of soil
CO2	Determine the permeability and seepage of soils for fluid flow characteristics analysis
CO3	Estimate stresses under various loading conditions and compaction characteristics.
CO4	Analyze the compressibility of the soils
CO5	Understand the strength of soils under various drainage conditions

UNIT -I:

INTRODUCTION: Soil formation – Soil structure – Adsorbed water – Mass- Volume relationship – Relative density. Index Properties Of Soils: Moisture Content, Specific Gravity, In-situ density, Grain size analysis – Sieve and Hydrometer methods – Consistency limits and indices – I.S. Classification of soils.

UNIT -II:

PERMEABILITY: Soil water – Capillary rise – flow of water through soils – Darcy‘s law-permeability – Factors affecting – Laboratory determination of coefficient of permeability – Permeability of layered systems.

SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –Quick sand condition – Seepage through soils – Flow nets : Characteristics and Uses.

UNIT -III

STRESS DISTRIBUTION IN SOILS: Boussinesq‘s and Wester guard‘s theories for point loads and areas of different shapes – Newmark‘s influence chart . Compaction: Mechanism of

compaction – Factors affecting – effects of compaction on soil properties. – Field compaction Equipment – Compaction control.

UNIT -IV:

CONSOLIDATION : Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - Stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil and under consolidated soil – pre-consolidation pressure and its determination – Terzaghi‘s 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods.

UNIT -V:

SHEAR STRENGTH OF SOILS : Importance of shear strength – Mohr‘s– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Critical void ratio –Liquefaction.

TEXT BOOKS:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors Delhi.
2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

REFERENCES:

1. Soil Mechanics and Foundation by byB.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. Geotechnical Engineering by Iqbal H.Khan, PHI pubilishers.
3. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi.

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SubjectCode	Title of the Subject	L	T	P	C
	WATER RESOURCES ENGINEERING-II (PEC-I)	3	0	0	3

COURSE OBJECTIVE:
The objectives of this course are:

1	Introduce the types of irrigation systems and introduce the concepts of planning and design of irrigation systems
2	Understand design methods of erodible and non-erodible canals
3	Know the principles of design of hydraulic structures on permeable foundations
4	Know the concepts for analysis and design principles of storage and diversion works.
5	Learn design principles of canal structures

COURSE OUTCOMES:

On Completion of the course, the students will be able to:

1	Understand the concepts of Cross Drainage works and Canal Regulation works
2	Understand various stream flow measurements technique and basic concepts in river engineering
3	Determine the storage capacity of reservoir and yield from the reservoir
4	Analyze the stability of gravity dam and seepage pattern in earth dam
5	understand about the spillways, Gates & Energy dissipaters.

UNIT – 1

CANAL REGULATION WORKS: Canal falls: Necessity and location of falls; Types of falls; Classification of falls; Design of sarada type fall.

Canal regulators: head regulators and cross-regulators; design of cross-regulator and distributary head regulator.

CROSS DRAINAGE WORKS: Introduction; types of cross drainage works; selection of suitable type of cross drainage work; classification of aqueducts and siphon aqueducts.

UNIT-II

STREAM GAUGING: Necessity; Selection of gauging sites; Methods of Discharge Measurement Area-Velocity method; Slope-Area method; Tracer method, Electromagnetic induction method, Ultrasonic method; Measurement of depth –Sounding rod, Echo-Sounder; Measurement of velocity: Floats – Surface floats, Sub–Surface float or Double float, Velocity rod; Pitot tube ;Current meter-Rating of current meter, measurement of velocity; chemical method; Measurement of stage-Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage-discharge curve.

RIVER ENGINEERING:

Classification of rivers; Meandering; Causes of meandering; Basic factors controlling process of meandering; Aggrading type of river; Degrading type of River.

UNIT-III

RESERVOIR PLANNING:

Introduction; Investigations for reservoir planning; Selection of site for a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass in flow curve; Determination of safe yield from a reservoir of a given capacity; Sediment flow in streams: Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Flood routing; Methods of flood routing-Graphical Method (Inflow – Storage discharge curves method).

DAMS :GENERAL: Introduction; Classification according to use; Classification according to material- Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams-Advantages and disadvantages; Physical factors governing selection of type of dam ; selection of site for a dam.

UNIT-IV

GRAVITY DAMS: Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure: stability requirements; principal and shear stresses; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam- High and low gravity dams; Design of gravity dams–single step method;

EARTH DAMS: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures;

UNIT-V

SPILLWAYS: Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons; Spillway crest gates-Types and description only.

WATER POWER ENGINEERING: Development of hydro power in India; Classification of hydel plants: runoff river plants, storage plants and pumped storage plants; low, medium and high head schemes.

TEXT BOOKS:

1. Irrigation and Water Power Engineering by Dr. B.C.Punmia& Dr. Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi.
2. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Irrigation, Waterpower and Water Resources Engineering by K R Arora; Standard Publication,New Delhi.
3. Water resources engineering by Satyanarayana Murthy. Challa, New Age International Publishers

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SubjectCode	Title of the Subject	L	T	P	C
	SUBSURFACE INVESTIGATION ANDINSTRUMENTATION (PEC-I)	3	0	0	3

COURSE OBJECTIVES:
The objectives of this course are:

COURSE OUTCOMES:
On Completion of the course, the students will be able to:

1.	Understand the exploration and geophysical methods
2.	Handle both laboratory and in-situ testing techniques.
3.	Carry out collection, handling and preservation of samples.
4.	Handle instruments during sub soil exploration process
5.	Understand the usage of instrumentation in subsurface investigation

UNIT -I
Exploration and geophysical methods:
Exploration program planning -Methods of exploration- Preliminary and detailed design- spacing and depth of bores, data presentation. Geophysical exploration and interpretation, seismic and electrical methods, cross bore hole, single bore hole – Up hole -Down hole methods.
UNIT –II
Exploration Techniques
Methods of boring and drilling, non-displacement and displacement methods, drilling in difficult subsoil conditions, limitations of various drilling techniques, stabilization of boreholes, bore logs.
UNIT -III
Soil Sampling
Sampling Techniques – Quality of samples – Factors influencing sample quality - Disturbed and undisturbed soil sampling advanced sampling techniques, offshore sampling, shallow penetration samplers, preservation and handling of samples.
UNIT -IV
Field Testing In Soil Exploration
Field tests, penetration tests, Field vane shear, Insitu shear and bore hole shear test, pressure meter test, dilatometer test - Plate load test–Monotonic and cyclic; field permeability tests – Block vibration test. Procedure, limitations, Correction and data interpretation.

UNIT -V

Instrumentation

Instrumentation in soil engineering, strain gauges, resistance and inductance type, load cells, earth pressure cells, settlement and heave gauges, pore pressure measurements - Slope indicators, sensing units, case studies.

TEXT BOOKS:

1. Alam Singh and Chowdhary G. R., "Soil Engineering in Theory and Practice, Volume-2, Geotechnical testing and instrumentation‖, CBS Publishers and Distributors, New Delhi, 2006.
2. Dunnicliff J., and Green, G. E., "Geotechnical Instrumentation for Monitoring Field Performance", John Wiley, 1993.

REFERENCES:

1. Bowles J. E., "Foundation Analysis and Design", 5th Edition, The McGraw-Hill companies, Inc., New York, 1995.
2. C. Venkataramiah, –Geotechnical Engineering‖, New age International Pvt . Ltd, (2002).
3. Hanna T. H., "Field Instrumentation in Geotechnical Engineering", Trans Tech., 1985.
4. Hunt R. E., –Geotechnical Engineering Investigation Manual‖, McGraw Hill, 1984.

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Subject Code	Title of the Subject	L	T	P	C
	Cost Effective Housing Techniques (PEC-I)	3	0	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1	To understand the requirements of structural safety for future construction.
2	To know about the housing scenario, housing financial systems land use and physical planning for housing and housing the urban poor
3	To know the traditional practices of rural housing
4	To know the different innovative cost effective construction techniques
5	To know the alternative building materials for low cost housing.

COURSE OUTCOMES:

On Completion of the course, the students will be able to:

CO1	Apply the concept of housing techniques and Understand housing programmes and projects
CO2	Understand development and adoption of low cost housing technology
CO3	Understand the Alternative building materials for low cost housing
CO4	Understand low cost housing in rural areas
CO5	Understand housing in disaster prone areas

UNIT-I:

a) Housing Scenario

Introducing - Status of urban housing - Status of Rural Housing

b) **Housing Finance**:

Introducing - Existing finance system in India - Government role as facilitator - Status at Rural Housing Finance - Impedimently in housing finance and related issues

a) Land use and physical planning for housing

Introduction - Planning of urban land - Urban land ceiling and regulation act - Efficiency of building bye lass - Residential Densities

b) Housing the urban poor

Introduction - Living conditions in slums - Approaches and strategies for housing urban poor

UNIT-II: Development and adoption of low cost housing technology

Introduction - Adoption of innovative cost effective construction techniques - Adoption of precast elements in partial prefatroices - Adopting of total prefactcation of mass housing in India- General remarks on pre cast rooting/flooring systems -Economical wall system - Single Brick thick loading bearing wall - 19cm thick load bearing masonry walls - Half brick thick load bearing wall – Fly-ash gypsum thick for masonry - Stone Block masonry - Adoption of precast R.C. plank and join system for roof/floor in the building

UNIT-III: Alternative building materials for low cost housing

Introduction - Substitute for scarce materials – Ferro-cement - Gypsum boards - Timber substitutions - Industrial wastes - Agricultural wastes - Fitirestarateru; for ,p,topm of alternative building maintenance

Low cost Infrastructure services:

Introduce - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy

UNIT-IV: Rural Housing:

Introduction traditional practice of rural housing continuous - Mud Housing technology

Mud roofs - Characteristics of mud - Fire treatment for thatch roof - Soil stabilization - Rural Housing programs

UNIT-V: Housing in Disaster prone areas:

Introduction – Earthquake - Damages to houses - Traditional prone areas - Type of Damages and Railways of non-engineered buildings - Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions. Requirement‘s of structural safety of thin precast roofing units against Earthquake forces Status of R& D in earthquake strengthening measures - Floods, cyclone, future safety

TEXT BOOKS

1. Building materials for low –income houses – International council for building research studies and documentation.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Properties of concrete – Neville A.m. Pitman Publishing Limited, London.
4. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963.
5. Low cost Housing – G.C. Mathur.
6. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Ramachandra Murthy &G.Annamalai.

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Semester-5 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	EXPERIMENTAL STRESS ANALYSIS (OEC-I)	2	1	0	3

Course Objectives:

The objectives of this course are:

1	To understand different methods of experimental stress analysis
2	To understand the use of strain gauges for measurement of strain
3	To be exposed to different Nondestructive methods of concrete
4	To understand the theory of photo elasticity and its applications in analysis of structures
5	To understand different methods of photo elasticity

COURSE OUTCOMES:

At the end of the course student is able to :

1	Understand different methods of experimental stress analysis
2	Understand the use of strain gauges for measurement of strain
3	Expose to different Non destructive methods of concrete
4	Understand the theory of photo elasticity and its applications in analysis of structures
5	Understand different methods of photo elasticity

UNIT:I

PRINCIPLES OF EXPERIMENTAL APPROACH :-

Merits of Experimental Analysis Introduction, uses of experimental stress analysis Advantages of experimental stress analysis, Different methods –Simplification of problems.

UNIT:II

STRAIN MEASUREMENT USING STRAIN GAUGES :-

Definition of strain and its relation of experimental Determinations Properties of Strain-Gauge Systems-Types of Strain Gauges –Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – Various types –Gauge factor – Materials of adhesion base.

UNIT:III

STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE:-

Introduction – The three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge.

Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.

UNIT:IV

THEORY OF PHOTOELASTICITY :-

Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polar scope for various arrangements – Fringe Sharpening. Brewster's Stress Optic law.

UNIT:V

TWO DIMENSIONAL PHOTOELASTICITY :-

Introduction – Isochramic Fringe patterns- Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

Text Books :-

1. Experimental stress analysis by J.W.Dally and W.F.Riley, College House Enterprises
2. Experimental stress analysis by Dr.SadhuSingh.khanna Publishers

Reference Books :-

3. Experimental Stress analysis by U.C.Jindal, Pearson Pubilications.
4. Experimental Stress Analysis by L.S.Srinath, MC.Graw Hill Company Publishers.

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Semester-5 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	ENVILRONMENTAL IMPACT ASSESSMENT (OEC-I)	2	1	0	3

Course Objectives:

The objectives of this course are:

1	To impart knowledge on different concepts of Environmental Impact Assessment.
2	To teach procedures of risk assessment.
3	To teach the EIA methodologies and the criterion for selection of EIA methods.
4	To teach the procedures for environmental clearances and audit.
5	To know the impact quantification of various projects on the environment.

Course Outcomes

At the end of the course, the students will be able to:

1	Prepare EMP, EIS, and EIA report**.**
2	Identify the risks and impacts of a project**.**
3	Choose an appropriate EIA methodology**.**
4	Evaluation the EIA report**.**
5	Estimate the cost benefit ratio of a project**.**

UNIT –I:

Concepts and methodologies of EIA

Initial environmental Examination, Elements of EIA, - Factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters- Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT – II

Impact of Developmental Activities and Land Use

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface

water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT –III

Assessment of Impact on Vegetation, Wildlife and Risk Assessment

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation - Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-Advantages of Environmental Risk Assessment

UNIT – IV

Environmental audit:

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT – V

Environmental Acts and Notifications:

The Environmental protection Act, The water preservation Act, The Air (Prevention & Control of pollution Act), Wild life Act - Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- Evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000.

TEXT BOOKS:

1. Canter Larry W., ‒Environmental Impact Assessment‖, McGraw-Hill education Edi (1996)
2. Y. Anjaneyulu, ‒Environmental Impact Assessment Methodologies‖, B. S. Publication, Hyderabad.

REFERENCES:

1. Peavy, H. S, Rowe, D. R, Tchobanoglous, ‒Environmental Engineering‖, G.Mc-Graw Hill International Editions, New York 1985
2. J. Glynn and Gary W. Hein Ke, ‒Environmental Science and Engineering‖, Prentice Hall Publishers
3. Suresh K. Dhaneja, ‒Environmental Science and Engineering‖, S.K., Katania& Sons Publication, New Delhi.
4. H. S. Bhatia, ― Environmental Pollution and Control‖, Galgotia Publication (P) Ltd, Delhi.

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B.Tech (R-19 Civil Engineering)
Semester-5 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	Project Management	2	1	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1	To impart knowledge on principles of planning and scheduling projects, with emphasis on construction.
2	To understand the uses and suitability of various construction equipment,
3	To study the legal and ethical issues related to construction projects
4	To become familiar with TQM and similar concepts related to quality
5	To impart knowledge in the principles of safe construction practices

COURSE OUTCOMES:

At the end of the course student is able to :

1	Plan and schedule a construction project.
2	Select an appropriate construction equipment for a specific job
3	Familiarise the legal procedures in construction contracts
4	Formulate suitable quality management plan for construction
5	Familiarise the safety practices and procedures.

Unit – I

Unique features of construction projects ; Identification of components –Principles of preparing DPR- Construction planning and scheduling - I – Bar charts, Network Techniques, Use of CPM and PERT for planning – Drawing network diagrams – Time estimates – Slack – Critical path-Examples

Unit – II

Crashing and time –Cost trade off, Resource smoothing and resources leveling - Construction, equipment, material and labor schedules. Preparation of job layout. Codification of the planning system : Codification approach- Work package and activities identification code – Resource codes – Cost and Finance accounting codes – Technical document codes.

Unit – III

Construction disputes and settlement: Types of disputes – Modes of settlement of disputes – Arbitration- Arbitrator - Advantages and disadvantages of arbitration – Arbitration Award.

Construction cost and budget: Construction cost – Classification of construction cost – Unit rate costing of resources- Budget – Types of budget – Project Master budget.

Unit – IV

Concept of materials management – Inventory – Inventory control – Economic order quantity- ABC analysis. Safety in construction – Safety measures in different stages of construction – Implementation of safety programme

Unit – V

onstruction procedures: different methods of construction – Types of contract – Tenders – Prequalification procedure - earnest money deposit – Contract document – General and important conditions of contract - Measurement and measurement book - Inspection and quality control - Need, principles and stages. Basics of Total Quality Management.

Text Books:

1. Kumar Neeraj Jha, Construction Project Management, Pearson, Dorling Kindersley (India) pvt. Lt
2. B.C.Punmia& K K Khandelwal, Project Planning with CPM and PERT, Laxmi Publication, New Delhi, 2016
3. L.S. Srinath – PERT and CPM –Principles and Applications, Affiliated East-West Press, 2001
4. Peurifoy and Schexnayder – Construction Planning, Equipment, and Methods, Tata McGraw Hill, 2010
5. Gahlot and Dhir, Construction Planning and Management, New Age International, 1992
6. K KChitkara, Construction Project Management, McGraw Hill Education Pvt Ltd., 2000
7. National Building Code, BIS
8. F. Harris, Modern Construction and Ground Engineering Equipment and Methods, Prentice Hall, 1994
9. Khanna, O.P., Industrial Engineering and Management., Dhanapat Rai Publications, 1980
10. Shrivastava, Construction Planning and Management, Galgotia Publications, 2000

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DEPARTMENT OF CIVIL ENGINEERING
SEMESTER-5
(Open Elective - 1)

Subject Code	Title of the Subject	L	T	P	C
	Introduction to Java Programming	2	1	0	3

COURSE OBJECTIVES	
1	Study the computer basics , software engineering and network basics , HTML
2	Learn Java features to create applications & perform event handling .
3	Learn the Database and interconnection with java.

COURSE OUTCOMES	
1	Ability to know basics of computer and software engineering
2	Ability to write Efficient programs of HTML
3	Create Tables with the databases and retrieving by using queries.
4	Able to design java application and dynamic behavior of classes.
5	Develop applications using different types ofinheritance, polymorphism, overloading and overriding and Database and interconnection with java

UNIT-1

Introduction to Computer Basics: Computer, Hardware, CPU, Monitor, Keyboard/mouse, Memory, - RAM, Storage, Software, OS,Application, Saving a file, Files and Folders.

Basics of Network: Home and Office Networks, Networking Types and Structures, Wired vs Wireless Networks,Networking Topologies, Networking Topology- Physical vs Logical, Peer to Peer, Client Server, Network Size.

Networking Levels and Layers and Protocols: Network Addressing, Classes of IPv4, Public and Private IP Addresses, What is a Protocol? What is a Protocol Suite?

Protocol Stacks, Networking and Internet Service: IP protocol, DHCP (Dynamic Host configuration Protocol), DNS (domain Name Service), General Networking Physical Component.

Software Engineering Fundamentals : Software Requirement, Problem Recognition, Evaluation and Synthesis, Modeling, Specification, Review, Objectives of Software Design, Software Design Concepts, Different levels of Software Design, Software Design Process, Architectural Design, Structured Programming, Functional Programming, Programming style, Software Documentation, Software Implementation Challenges , Software Validation, Software Verification, Manual Vs Automated Testing,

Testing Approaches, Testing Levels, Testing Documentation, Testing vs. Quality Control, Quality Assurance and Audit

Software Engineering Fundamentals & OOP: Overview of Software Maintenance Need for Maintenance, Categories of Software Maintenance.

Overview of Configuration management and version control : What is Software Configuration Management?, Why do we need Configuration management?, Tasks in SCM process, Configuration Identification, Baseline, Change Control, Configuration Status Accounting, Configuration Audits and Reviews, Participant of SCM process, Software Configuration Management Plan, Software Configuration Management Tools.

Agile Basics:

What is Agile?, What are Agile Methodologies?, What is the Agile Manifesto?, What is Agile project management?, Agile Scrum methodology.

OOP :

Object Oriented Concepts Problems in Functional Programming, What Is ObjectOriented Programming? , Objects and Classes Declaration of Class, Declaring Objects, State of an Object, Behaviour of an Object Principles in ObjectOriented technology Abstraction, Encapsulation

OOP & HTML, CSS and JavaScript:

Principles in Object-Oriented technology, Inheritance, Polymorphism
HTML, CSS and JavaScript
Introduction to Web Technology

World Wide Web, IoT, Web Programming, Web Framework, HTML, CSS and JavaScript
Introduction to HTML5: HTML5 Elements, Semantic Elements HTML Overview, HTML Versions, Semantic Web, Semantic Elements in HTML5, <header>, <nav>, <section>, <article>, <aside>, <footer>

Table, List, Working with Links, Image Handling

Define an HTML Table, <table>, <tr>, <td>, <th>, <caption>, Unordered List, Ordered List, Description List, <ul>, <ol>, <li>, <dl>, <dt>, <dd>, Hyperlinks, The target Attribute, Absolute URLs vs. Relative URLs, Use an Image as a Link, Link to an Email Address, <a>, href Attribute, <img>, The src Attribute, The alt Attribute, Image Size - Width and Height, Image as a Link

Form-Input Elements, HTML5 Form elements

The <form> Element, The <input> Element, Text Fields, The <label> Element, Radio Buttons, Checkboxes, The Submit Button

UNIT-II

HTML, CSS and JavaScript:

HTML5 Attributes, Video & Audio, iframes

Standard Attributes, align, background, bgcolor, class, height, hidden, id, style, tabindex, valign, width, Embedding Video, Embedding Audio, Handling Media Events, HTML <iframe> Tag

Introduction to CSS3, CSS Syntax, CSS Styling

What is CSS, Why use CSS, Inline Style, CSS Style Tags, Linking to CSS, Style Override Precedence

Text and Fonts properties, CSS Selectors, Different color schemes

Text Color and Background Color, CSS Text Alignment, Text Direction, Vertical Alignment, Generic Font Families, The CSS font-family Property, Font Style, Font Size

CSS Borders, CSS Margins, CSS Backgrounds

CSS Border Style, The border-style property, Border Width, Border Color, Border Sides, CSS Rounded Borders, margin-top, margin-right, margin-bottom, margin-left, CSS background-color, Opacity / Transparency, CSS background-image, CSS background-repeat

JavaScript basics

Introduction to Javascript, Execution of Javascript, Scripts in head and body of HTML, Internal and External Javascript, Javascript Variables, Comments

Functions in Javascript

JavaScript Function Syntax, Built in methods in Javascript, Function Invocation, Function Return, Why Functions?, The () Operator Invokes the Function, Functions Used as Variable Values, Local Variables

Javascript validation

Client-side form validation, Different types of client-side validation, Using built-in form validation, Validating forms using JavaScript, Validating forms without a built-in API

Events, Javascript event handling

Introduction to JavaScript events, Event flow, Event bubbling, Event capturing, Event object, addEventListener(), preventDefault(), stopPropagation()

JavaScript Strings

String Methods and Properties, String Length, Extracting String Parts, The substring() Method, Replacing String Content, Converting Upper and Lower Case, The concat() Method

JavaScript Dates

JavaScript Date Output, Creating Date Objects, new Date(),new Date(year, month, ...), new Date(dateString), Date Methods, Displaying Dates

Array in Javascript

What is an Array, Creating an Array, Accessing Array Elements, Array Properties and Methods, Looping Array Elements

Document Object Model (Window, Frame, Navigator Objects)

What is Document Object Model (DOM), Node Types, The nodeName and nodeValue properties, Node and Element, Node Relationships

Working with Document Object (Its Properties and methods, Cookie handling)

Selecting Elements, Traversing Elements, Manipulating Elements

RDBMS Concepts and SQL Using Oracle:

Introduction to RDBMS Concepts

What is a Relational Database, The relational model, Benefits of relational database management system, ACID properties and RDBMS ,Introduction to SQL History of SQL, SQL Standards, How SQL Works Creating and Managing Tables , Guidelines for Managing Tables, Creating Tables, Altering Tables, Dropping Tables, Data Manipulation: INSERT, UPDATE, DELETE

UNIT-III

RDBMS Concepts and SQL Using Oracle:

Basic SQL SELECT Statements

SELECT, FROM Clause, Comparison Operators, WHERE Clause, ORDER BY, AND, OR, DISTINCT, IN, IS NULL, IS NOT NULL, LIKE, REGEXP_LIKE, NOT, ALIASES

Scalar & Aggregate Functions

String Functions, Numeric Functions, Date Functions, Conversion Functions, NULL-related Functions, AVG, COUNT, MAX, MIN, LISTAGG, SUM

Joins & Subqueries

Oracle INNER JOIN, Oracle LEFT JOIN, Oracle RIGHT JOIN,

Introduction to the Oracle Subquery: Advantages of Oracle Subqueries, Oracle Subquery in the SELECT clause, Oracle Subquery in the FROM clause, Oracle Subquery with comparison operators, Oracle Subquery with IN and NOT IN operators, Oracle correlated Subquery, Oracle correlated Subquery in the WHERE clause, Oracle correlated Subquery in the SELECT clause,

Oracle correlated Subquery with the EXISTS operator

Views & Index

What is a VIEW in Oracle, Create VIEW, Update VIEW, DROP VIEW, What is an Index in Oracle, Create an Index, Create a Function-Based Index, Rename an Index, Drop an Index

RDBMS Concepts and SQL & Introduction to Java:

Sequence, Synonym

About Sequences, Creating Sequences, Altering Sequences, Using Sequences, Dropping Sequences

About Synonyms, Creating Synonyms, Using Synonyms in DML Statements, Dropping Synonyms

Data Control Language Statements , GRANT, REVOKE

Introduction to Java

Features of Java, Java Runtime Environment, Developing software in Java

UNIT-IV

Introduction to Java Programming

Language Fundamentals: Keywords, Primitive Data Types, Operators and Assignments, Flow Control: Java‘s Control Statements.

Classes and Objects: Access Specifiers, Constructors - Default and Parameterized, Method & Constructor Overloading, this reference, using static keyword, Wrapper Classes, Using Scanner Class

Strings, String Handling functions. Array: One dimensional array, Array of Objects, Using varargs, Using Arrays class.

UNIT-VCollections:

Collection basics, Set, HashSet, Map, HashMap, List, Array List.

JDBC: JDBC Basics, JDBC architecture, JDBC Drivers. Process SQL with JDBC, JDBC Introduction JDBC Driver, Create Connection, Query, Update.

Text books:

1. https://www.geeksforgeeks.org
2. https://www.w3schools.com
3. https://www.oracletutorial.com
4. https://www.tutorialspoint.com
5. https://www.javatpoint.com

References:

1. https://www.pcmag.com/encyclopedia
2. https://www.computerhope.com
3. https://courses.lumenlearning.com
4. https://docs.microsoft.com/en-us/windows-server/networking/technologies

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTHAPURAMU
DEPARTMENT OF CIVIL ENGINEERING
SEMESTER-5
(Open Elective - 1)

Subject Code	Title of the Subject	L	T	P	C
	Java Programming Lab		-	-	-

COURSE OBJECTIVES	
1	Study the computer basics , software engineering and network basics , HTML
2	Learn Java features to create applications & perform event handling .
3	Learn the Database and interconnection with java.

COURSE OUTCOMES	
1	Ability to know basics of computer and software engineering
2	Ability to write Efficient programs of HTML
3	Create Tables with the databases and retrieving by using queries.
4	Able to design java application and dynamic behavior of classes.
5	Develop applications using different types of inheritance, polymorphism, overloading and overriding and Database and interconnection with java

Week-1:

1. Problem Title: BankAccount Class:
   - Create a Java class called BankAccount which represents a bank account, having as attributes: accountNumber (numeric type), name (name of the account owner as string type), balance.
   - Create a constructor with parameters: accountNumber, name, balance.
   - Create a deposit() method which manages the deposit actions.
   - Create a withdrawal() method which manages withdrawals actions.
   - Create a bankFees() method to apply the bank fees with a percentage of 5% of the balance account.
   - Create a display() method to display account details.
   - Give the complete code for the BankAccount class.

Week-2:

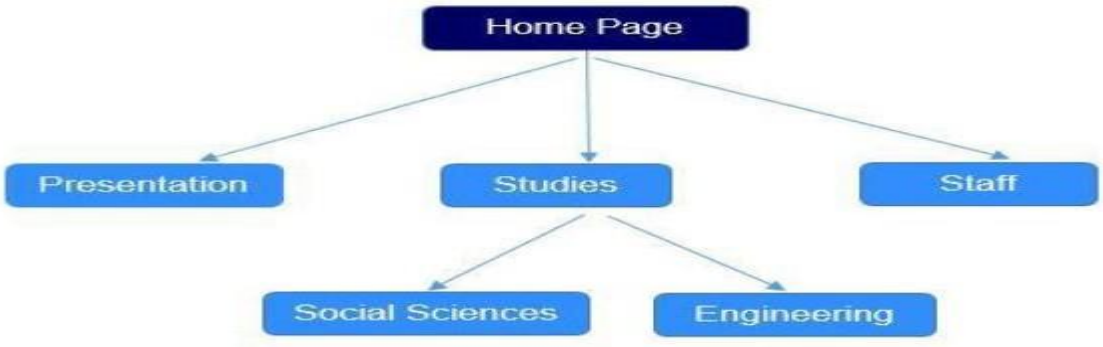
2. Problem Title: Person Class

- Create a Java class Person with attributes: name and age of type string.
- Create a display() method that displays the name and age of an object created via the Person class.
- Create a child class Student which inherits from the Person class and which also has a section attribute.
- Create a method displayStudent() that displays the name, age and section of an object created via the Student class.

- Create a student object via an instantiation on the Student class and then test the displayStudent method.

Week-3:

3. Create a website with the following information and structure using HTML5:



The contents of the home page should be:

- Logo and title of the website
- Navigation bar: links to presentation, studies and staff
- News (aside/article/section)
- Announcements (aside/article/section)
- Footer: contact information and copyright
- Use these tags: <header>, <nav>, <aside>, <article>, <section>, <time>, <footer>.
- Here logo image, news, announcements used can be any suitable data

Design below form using HTML5:

Vistor Entry Form

Name	Enter your name
Gender	○ Male ○ Female
Mobile Number	Enter your mobile number
Address	Enter your address
City	Mumbai
How you come to know about us	☐ Tv news ☐ Internet
	Reset Submit

Note:

-City is drop down list with multiple city names

-Name, mobile number, address are mandatory fields. If any of these field is empty, after clicking submit button, it should show like this.

Week-4:

4. Problem Description:

1. To Create this a HTML Application create a folder called TestCSS.
2. create a file called TableWithCSS.html
3. In the body tag, create a table with header, table rows and table data.
4. Use Internal CSS and provide styles as in sample output
5. Use any png image as background to table header with border radius of 6px.Refer to output for color, height, width and font-size.
6. For the table, provide collapse to border-collapse attribute
7. For table data provide border of 1 px dotted and padding of 15px, width 100px, refer to other properties and background color as in output
8. Run the Application in Live Server as http://127.0.0.1:5500/TableWithCSS.html

Or open the Application in browser

Week-5:

5. Problem Description:

1. To Create this HTML Application, create a folder called Telephone.
2. create a file called TelephoneComplaint.html
3. In the body tag create a form and table as shown in sample output with the labels and input types as shown.
4. Include the following options under Nature Of Complaint
5. 1.Disconnection Problem 2.Phone Dead

3.Other

6. Create a TelephoneComplaint.css file and define the CSS properties here as per sample output

Link CSS file to HTML file.

Sample output:

Week-6:

6. Problem Description:

1. To Create this HTML Application, create a folder called pyramid.
2. Create a file called pyramid.html
3. Use internal JS and define a function called buildPyramid with the number of rows as parameter
4. Write the logic to construct a pyramid in the function.
5. Invoke the function with any value as row argument.

Open the application in browser or run in Live Server with URL as http://127.0.0.1:5500/pyramid.html

Sample output:

Week-7:

7. Problem Description:

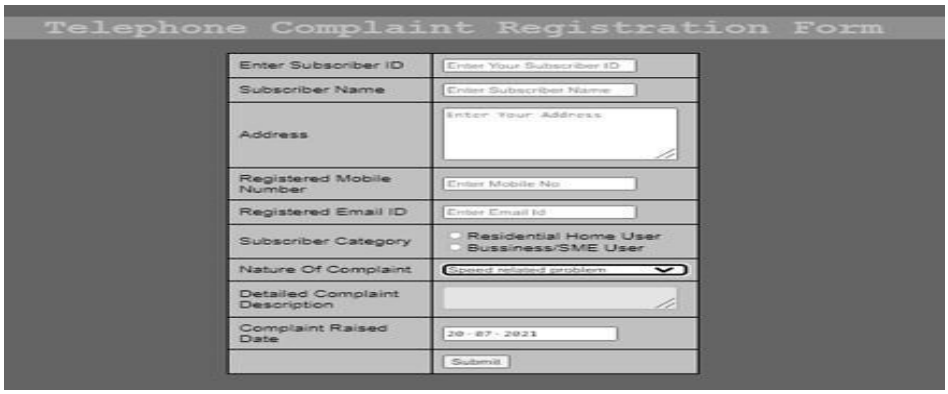
For this Application, use the existing application TelephoneComplaint.html created in folder Telephone under section 4.3

Modify the HTML page to include the below validations in JavaScript

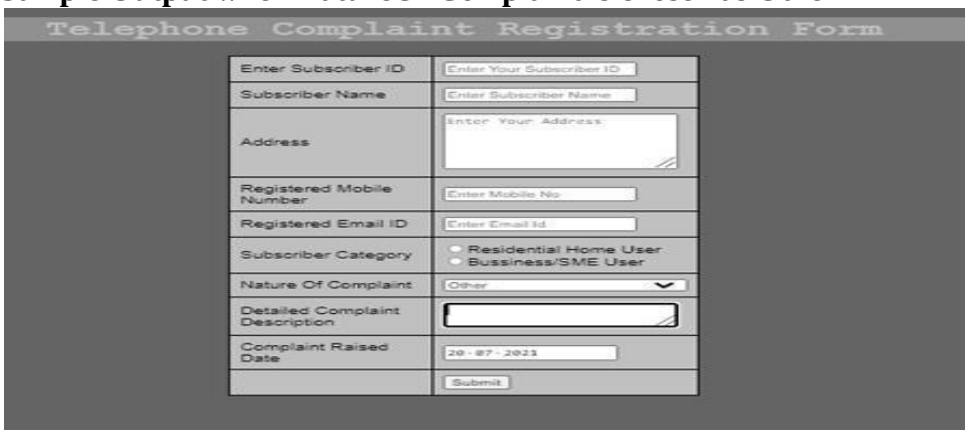
1. Subscriber Name is required and should have max length of 10.
2. validate Email to have @ and. symbol.
3. Registered Mobile number should be 10 digits

Detailed Complaint Description box should be disabled initially, and when user chooses Other option in Nature of Complaint, Description box should get enabled and get disabl ed when a subscriber changes the Nature Of Complaint to something else. (Disconnection Problem/Phone Dead).
Hint: Use onchange event and write JS Code in function enableDisableTextBox(this) to enable/disable description box. This refers to the option currently selected
Complaint raised date should be current date and shouldn‘t be changed, it should be readyonly and the date should be populated as soon as the form loads in browser.
Hint: write code in JS function getDate() to load current date. Invoke this function using window.onload.
Open the application in browser or in LiveServer with URL as
http://127.0.0.1:5500/TelephoneComplaint.html

Sample Output when form loads on browser (Assume sysdate/currentDate is 20-07-2021)



Sample Output when NatureOf Complaint is chosen as Other



8. Problem Description:

Zip codes consist of 5 consecutive digits. Given a string, write a JavaScript function isValid(zipCode) to determine whether the input is a valid zip code.
A valid zip code is as follows:
• Must only contain numbers (no non-digits allowed).
• Must not contain any spaces. Must not be greater than 5 digits in length

Examples:

isValid("59001") ➞ true isValid("853a7") ➞ false isValid("732 32") ➞ false isValid("393939") ➞ false

A group of friends have decided to create a secret code which will be used to login their application. This code will be the first letter of their names, sorted in alphabetical order and count of group members.

Create a function that takes in an array of names and returns the secret code.

Examples:
findCode(["Adam", "Sarah", "Malcolm"]) ➞ "AMS3"
findCode(["Harry", "Newt", "Luna", "Cho"]) ➞ "CHLN4"
findCode(["Phoebe", "Chandler", "Rachel", "Ross", "Monica", "Joey"]) ➞ "CJMPRR6"

Note

The secret code name should entirely uppercased

Week-8:

9. **Problem Description:**

1. To Create this application, create a folder called DomManipulation.
2. Create a HTML file called dom.html with hyperlink for the paragraph text
3. –[On mouse hover here bold words of the following paragraph will be highlighted]‖
4. Include 2 events onMouseOver and onMouseOut for the above hyperlink. For onMouseOver definea function highlight() and for onMouseOut define a function return_normal.
5. Include the other paragraph having bold(strong) and non bold text as in output.
6. Create an external JS called dom.js and link to html file.

7. Define following functions in dom.js such that when window loads, it invokes function getBold_items().

getBold_items() gets all the bold tags with tagname strong and stores it.

9. highlight() iterates all stored bold tags and changes color to red.
10. return_normal() makes all highlighted words dark once the mouse is moved out from hyperlink
11. Open the html application in browser or run in LiveServer with URL http://127.0.0.1:5500/dom.html

Sample Output:

On loading the page in browser

Sample output-1 when mouse is moved over hyperlink

Sample Output-2 when mouse is moved away from hyperlink

10. **Problem Description:**

Given a list of items

```
<ul id="menu">
<li>Homepage</li>
<li>Services</li>
<li>About</li>
<li>Contact</li>
</ul>
```

Manipulate DOM using JS such that the DOM is changed to

- Home
- Services
- About

11. Problem Description:

Using DOM Manipulation create a dynamic shopping List as below

My shopping list

Enter a new item: Add item

As items are entered, it gets added as below with the option to delete

My shopping list

Enter a new item: Add item

- Milk Delete
- Veggies Delete
- Chocolates Delete

When Chocolates is deleted, the List should be

My shopping list

Enter a new item: Add item

- Milk Delete
- Veggies Delete

Week-9:

12. Problem Title: Insert Records – Tickets

Insert the below records into tickets table.

Ticket_id	Schedule_id	User_id	No_seats
T1	S5	1	2

T2	S2	5	1

13. **Problem Title: Department name based on block number**

Write a query to display the names of the departments in block number 3 in ascending order.

14. **Problem Title: Students Name based on Start and Ending Character**

Write a query to display the names of the students that start with letter 'A' and end with the letter 'a', ordered in ascending order.

15. **Problem Title: Number of departments**

Write a query to display the block number and number of departments in each block and give an alias as NO_OF_DEPT. Sort the result based on NO_OF_DEPT in descending.

16. **Problem Title: Subject with Staff Details**

Write a query to display the subjectname, code and staff name who handles that subject, ordered by code in ascending order.

17. **Problem Title: Maximum mark in Subject with Staff name**

Write a query to display list of staff name, subject name handled and maximum mark scored in that subject. Give an alias to the maximum mark as max_mark. Sort the result based on maximum mark in descending

18. **Problem Title: Salesmen from New York**

Write a query to create a view for those salesmen belongs to the city New York. Refer the following schema

Salesman_id	name	city	commission
5001	James Hoog	New York	0.15
5002	Nail Knite	Paris	0.13
5005	Pit Alex	London	0.11
5006	Mc Lyon	Paris	0.14
5007	Paul Adam	Rome	0.13
5003	Lauson Hen	San Jose	0.12

Problem Title: Create Index on Customer table

Create an index named customer_name for the cust_name column of the customer table Refer the following schema

Week-10:

19. **Problem Title: Create Sequence**

Write a PL/SQL query to create an ascending sequence called id_seq, starting from 10, incrementing by 10, minimum value 10, maximum value 100.

20. **Problem Title: Use Sequence in a Table Column**

Create a new table called tasks with the below DDL query CREATE TABLE tasks(
id NUMBER PRIMARY KEY,

title VARCHAR2(255) NOT NULL
);
Create a sequence called task_id_seq for the id column of the tasks table and use it while inserting records to the tasks table:

21. **Problem Title: Print Name**

Write a Java program to print 'Hello' on screen and then print your name on a separate line.
Sample Output 1:
Hello Alex.

22. **Problem Title: Divide Numbers**

Write a Java program to divide two numbers and print on the screen.

Sample Input 1:
50/3
Sample Output 1:
16

23. **Write a Java program to Print "Hello World" 5 times using for loop.**

Sample Output 1:
Hello World Hello World Hello World Hello World Hello World

24. **Problem Title: Swap Numbers**

Write a Java program to swap two numbers.
Sample Input 1:
Input the First Number: 5 Input the Second Number: 6
Sample Output 1:
After Swapping: First Number : 6 Second Number : 5

25. **Problem Title: Fibonacci Sequence**

Construct Fibonacci sequence controlled by a do-while loop
Sample Output 1:
0,1,1,2,3,5,8,13,21,34

26. **Problem Title: Area of Circle**

Write a Java program to print the area of a circle. Radius = 7.5
Sample Output 1:
Area is = 176.71458676442586

27. **Problem Title: Temperature convertor**

Write a Java program to convert temperature from Fahrenheit (ex 212) to Celsius degree
Sample Input 1:

Given temperature in Fahrenheit: 212
Sample Output 1:

212.0 degree Fahrenheit is equal to 100.0 in Celsius

Week-11:
Problem Title: Product class

28. Create class ProductTwoNum with two integer values and computes their product by calling the instance method int computeProd(int num1, int num2).

Sample Input 1
Num1 : 20
Num2 : 3
Sample Output 1
The product of 20 and 3 is 60.
Problem Title: Area calculation and print details

29. Write a program to print the area of two rectangles having sides (4,5) and (5,8) respectively by creating a class named _Rectangle‘ with a method named _rectangleArea‘ which returns the area and length and breadth passed as parameters to its constructor.

Sample Output 1
Print the area of the Rectangle

Problem Description:

30. Smith has library of magazines. He wants to maintain information of magazines. Write a java program for this. Create a class Magazine with the following attributes: id, title, author, price Methods:

Sample Input 1

If below sample values are set for magazine object

Id	Title	Author	Price
23	Journey of Life	Michael Jo	600

Enter discount percentage: 5
Sample Output 1 Magazine Details: Id: 23
Title: Journey of Life Author: Michael Jo Price: 570

31. Problem Description:

Alina has to keep track of customers data who are buying products from her shop. For this create a class Customer with the following attributes:
customerId, customerName, contactNo, paymentDone

- Parameterized constructor
- displaydetails() to display the details of the magazines
- discountedPrice() : pass the discount percent, calculate the discount on price and return the amount to be paid after discount

Sample Input 1

If below sample values are set for customer object

customerId	customerName	contactNo	paymentDone
56	Anjali	9123456789	700
89	Sujoy	8123456790	360
22	Manju	7654389129	1200

Sample Output 1
Total payment done is 2260 Rs.
Highest payment done customer details: Customer Id: 22
Customer Name: Manju Contact number: 7654389129
Payment done: 1200

Week – 12:

32. **Problem Title: Palindrome check**

Write a program to Identify string given by user is palindrome or not.

Sample Input 1
Enter String: Malayalam
Sample Output 1
Given String is palindrome
Sample Input 2 Enter String: Test Sample Output 2
Given String is not palindrome

Problem Description:

33. **Write a java program with method checkEnding() that takes two strings and returns true if the first string ends with the second string, otherwise return false.**

Sample Input 1
checkEnding(‒abc‖,‖bc‖);
Sample Output 1
true
Sample Input 2 checkEnding(‒samurai‖,‖pi‖); Sample Output 2
False

34. **Problem Description:**

Write a Java program to calculate the average value of array elements.

Sample Output 1
Average value of the array elements is: 7.0
Problem Description:
Write a Java program to find the maximum and minimum value of an array.

Sample Output 1

Original Array: [25, 14, 56, 15, 36, 56, 77, 18, 29, 49]
Maximum value for the above array = 77 Minimum value for the above array = 14

Problem Description:

35. **Write a Java program to create a new array list, add some elements (string) and print out the collection.**

Sample Output 1:
[Red, Green, Orange, White, Black]
Problem Description:

36. **Problem Description:**

Write a Java program to iterate through all elements in a hash Map.

Sample Output 1:
Red White Pink Yellow Black Green

37. **Problem Description:**

Declare an ArrayList called numList to hold values of Integer type. Write code such that the duplicate values are removed.

Sample Input 1
[1,2,3,2,1,4,5,6,6,7,8,8]

Sample Output 1
[1,2,3,4,5,6,7,8]

38. **Problem Description:**

Write a program to store only unique elements of Employee type in the collection, the uniqueness of employee must be identified by the employeeId, the employee must have other properties like name, salary & designation. Print all the employees stored in the collection.
Hint: Use Set<Employee> set = new HashSet<Employee>(); to store the employee object

Sample Output 1
Employee Id = 100, Name = Alex, Salary = 25000, Designation = Manager Employee Id = 101, Name = Bruce, Salary = 15000, Designation = Tester

39. **Problem Description:**

Use the comparator and sort the employee‘s id in ascending and descending order and print the employees in both ascending & descending order

40. **Problem Description:**

Create a menu that will display 4 options

a. Store
b. Display by id
c. Delete by id
d. Exit

The menu should repeat until you enter exit, however the other options must perform operations like storing in the collection, displaying the item based on the id, deleting the item based on id. The item has to be an Employee with properties like id, name, salary and designation. Employee properties must be initialized dynamically

Define a Java Class Main and in main method write code to load driver and establish connection with database.

student Id	studentName	Branch	Percentage
100	Ann	Electronics	70.5
101	Ben	Computers	71.3
102	Ken	Mech	60
103	Ram	Computers	90
104	Bhim	Mech	72
105	Shyam	Computers	86

Sample Output:

studentId	studentName	Branch	Percentage
103	Ram	Computers	90
105	Shyam	Computers	86

Week-13:

41. Problem Description:

Create a menu that will display 4 options

a. Store
b. Display by id
c. Delete by id
d. Exit

The menu should repeat until you enter exit, however the other options must perform operations like storing in the collection, displaying the item based on the id, deleting the item based on id. The item has to be an Employee with properties like id, name, salary and designation. Employee properties must be initialized dynamically.

42. Write the menu driven program using JDBC which will have following options

a. Store
b. Display by id
c. Delete by id
d. Update salary by id
e. Exit

The menu should repeat until you enter exit, however the other options must perform operation like storing in the database, displaying the item based on the id, deleting the item based on id, updating the salary of the item based on id. The item has to be an Employee with properties like id, name, salary and designation. Employee properties must be initialized dynamically and also program must ask the id dynamically to perform display and delete and for update id and salary must be dynamic.

Text books:

6. https://www.geeksforgeeks.org
7. https://www.w3schools.com
8. https://www.oracletutorial.com
9. https://www.tutorialspoint.com
10. https://www.javatpoint.com

References:

5. https://www.pcmag.com/encyclopedia
6. https://www.computerhope.com
7. https://courses.lumenlearning.com
8. https://docs.microsoft.com/en-us/windows-server/networking/technologies

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)
Semester-5 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	CONCRETE TECHONOLOGY LAB	0	0	3	1.5

COURSE OUTCOMES

1	To determine the consistency and fineness of cement.
2	To understand the non-destructive testing procedure on concrete.
3	To determine the workability of cement concrete by compaction factor, slump and Vee-Bee tests
4	Ablility to know the setting times of cement.
5	To determine the specific gravity of fine aggregate and coarse aggregate.

1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.
5. Workability test on concrete by compaction factor, slump and Vee-bee.
6. Young‘s modulus and compressive strength of concrete.
7. Specific Gravity and Water Absorption of Coarse aggregate.
8. Bulking of Fine aggregate.
9. Non-Destructive testing on concrete (for demonstration)

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Vicat‘s apparatus
6. Specific gravity bottle.
7. Lechatlier‘s apparatus.
8. Slump and compaction factor setups
9. Longitudinal compressor meter and 1
10. Rebound hammer, Pulse velocity machine.
11. Relevant IS Codes

Reference books:-

1. Concrete Manual by M.L.Gambhir, DhanpatRai&co., Fourth edition.
2. Building construction and materials(Lab Manual) by Gambhir , TMH publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)
Semester-5 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	GEOTECHNICAL ENGINEERING LAB	0	0	3	1.5

OBJECTIVE:

The object of the course is to enable the students to know the various characteristics of soils

Course Outcomes:

At the end of the course, the student must be able to:

- Identify various soils based on their characteristics.
- Evaluate permeability and seepage of soils.
- Determine plasticity characteristics of various soils.
- Understand the consolidation process and thereby predicting the settlement of soils.

LABORATORY EXPERIMENTS

1. Specific gravity
2. Grain size analysis by sieving
3. Field density-Core cutter and Sand replacement methods
4. Atterberg‘s Limits.
5. Proctor Compaction test
6. Permeability of soil - Constant and Variable head tests
7. CBR Test
8. Direct Shear test
9. Unconfined Compression test
10. Triaxial Compression test (UU Test)
11. Differential free swell (DFS)
12. Hydrometer Analysis Test (Demonstration)
13. Consolidation test (Demonstration)
14. Vane Shear test

TEXT BOOKS:

1. K. R. Arora, –Soil Mechanics and Foundation Engg‖., Standard Publishers and Distributors, Delhi.
2. C. Venkataramiah, –Geotechnical Engineering‖, New age International Pvt . Ltd, (2002).

REFERENCES:

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, ―Soil Mechanics and Foundation‖, Laxmi publications Pvt. Ltd., New Delhi.
2. Gopal Ranjan & A. S. R. Rao, –Basic and Applied Soil Mechanics‖, New age International Pvt . Ltd, New Delhi.
3. Braja M. Das –Principles of Geotechnical Engineering‖, Cengage Learning.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)
Semester-5 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	Research Methodology	3	0	0	0

COURSE OBJECTIVES : The objective of this course is	
1	To understand the basic concepts of research and research problem
2	To make the students learn about various types of data collection and sampling design
3	To enable them to know the method of statistical evaluation
4	To make the students understand various testing tools in research
5	To make the student learn how to write a research report
6	To create awareness on ethical issues n research

COURSE OUTCOMES: At the end of the course, students will be able to	
CO1	Define the basic concepts and its methodologies
CO2	Understand the concept of sampling, research design etc.
CO3	Demonstrate the knowledge of research processes
CO4	Analyze the importance of research articles in their academic discipline
CO5	Select appropriate testing tools used in research
CO6	Design a research paper without any ethical issues

UNIT I Introduction to Research

Meaning of Research – Objectives of Research – Types of Research – Research Approaches – Guidelines for Selecting and Defining a Research Problem – Research Design – Concepts related to Research Design – Basic Principles of Experimental Design.

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the concept of research and its process
- Explain various types of research
- Know the steps involved in research design
- Understand the different research approaches

UNIT IISampling Design

Steps in Sampling Design –Characteristics of a Good Sample Design – Random Sampling Design. Measurement and Scaling Techniques-Errors in Measurement – Tests of Sound Measurement – Scaling and Scale Construction Techniques – Time Series Analysis – Interpolation and Extrapolation. Data Collection Methods – Primary Data – Secondary data – Questionnaire Survey and Interviews.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the concept of sampling and sampling design
- Explain various techniques in measurement and scaling
- Learn various methods of data collection
- Design survey questionnaires for different kinds of research
- Analyze the questionnaires

UNIT III Correlation and Regression Analysis

Method of Least Squares – Regression vs Correlation – Correlation vs Determination – Types of Correlations and Their Applications

LEARNING OUTCOMES:-After completion of this unit student will

- Know the association of two variables
- Understand the importance of correlation and regression
- Compare and contrast correlation and regression
- Learn various types of correlation
- Apply the knowledge of C&R Analysis to get the results

UNIT IV Statistical Inference

Tests of Hypothesis – Parametric vs Non-parametric Tests – Hypothesis Testing Procedure – Sampling Theory – Sampling Distribution – Chi-square Test – Analysis of variance and Co-variance – Multivariate Analysis

LEARNING OUTCOMES:-After completion of this unit student will

- Know the statistical inference
- Understand the hypothesis testing procedure
- Compare and contrast Parametric and Non-parametric Tests
- Understand the use of chi-square test in investigating the distribution of categorical variables
- Analyze the significance of variance and covariance

UNIT VReport Writing and Professional Ethics

Interpretation of Data – Report Writing – Layout of a Research Paper – Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars – Professional Ethics in Research.

LEARNING OUTCOMES:-After completion of this unit student will

- Learn about report writing
- Understand how to write research paper
- Explain various techniques of interpretation
- Understand the importance of professional ethics in research
- Design a scientific paper to present in the conferences/seminars

Text books:

1. Research Methodology:Methods and Techniques – C.R.Kothari, 2nd Edition, New Age International Publishers.
2. Research Methodology: A Step by Step Guide for Beginners- Ranjit Kumar, Sage Publications

REFERENCES:

1. Research Methodology and Statistical Tools – P.Narayana Reddy and G.V.R.K.Acharyulu, 1st Edition,ExcelBooks,New Delhi.
2. Business Research Methods–Donald R. Cooper & Pamela S Schindler, 9/e,
3. S C Gupta, Fundamentals of Statistics,7th Edition Himalaya Publications

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)
Semester-6 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	TRANSPORTATION ENGINEERING – I	2	1	0	3

COURSE OBJECTIVE:

The objectives of this course are:

1.	To make the student understand the importance of Highway Development in Social and Economic Development of a Nation
2.	To impart the concepts of Geometric Design of various Highway Infrastructure elements like Superelevation, Sight Distances, Radius of Curve, Extra widening etc
3.	To make the student aware of Basic Traffic Parameters and Surveys needed for Collecting Data about them
4.	To make the student understand the need for Management of Traffic in Urban areas and the measures available
5.	To familiarize the students with types of Road Intersections and their design elements

OUTCOMES:

On completion of the course, the students will be able to:

CO1	Understand the importance of Highway Development in Social and Economic Development of a Nation
CO2	Understand the concepts of Geometric Design of various Highway Infrastructure elementslike Super elevation, Sight Distances, Radius of Curve, Extra widening etc
CO3	Understand of Basic Traffic Parameters and Surveys needed for Collecting Data about them
CO4	Understand the need for Management of Traffic in Urban areas and the measures available
CO5	Familiar with types of Road Intersections and their design elements capable of Designing Flexible and Rigid Pavements

UNIT I

HIGHWAY DEVELOPMENT AND PLANNING:

Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II

HIGHWAY GEOMETRIC DESIGN:

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements-

Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT – III

TRAFFIC ENGINEERING STUDIES:

Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation – Highway capacity and level of service concept – factors affecting capacity and level of service - Traffic Volume Studies- Data Collection and Presentation-Speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams.

TRAFFIC REGULATION AND MANAGEMENT:

Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Specifications - Design of Traffic Signals –Webster Method –Saturation flow – phasing and timing diagrams – Numerical problems.

UNIT – IV

INTERSECTION DESIGN:

Conflicts at Intersections- Channelization: Objectives –Traffic Islands and Design criteria- Types of At-Grade Intersections – Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT – V

PAVEMENT DESIGN:

Types of pavements – Difference between flexible and rigid pavements – Pavement Components – Sub grade, Sub base, base and wearing course – Functions of pavement components – Design Factors – Flexible pavement Design methods – G.I method, CBR Method, (as per IRC 37-2002) – Design of Rigid pavements – Critical load positions - Westergaard's stress equations – computing Radius of Relative stiffness and equivalent radius of resisting section – stresses in rigid pavements – Design of Expansion and contraction joints in CC pavements. Design of Dowel bars and Tie bars.

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 7th edition (2000).
2. Traffic Engineering and Transportation Planning by L.R.Kadiyali and Lal- Khanna Publications.

REFERENCES:

1. Principles and Practice of Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.
2. Text book of Highway Engineering by R.Srinivasa Kumar, Universities Press, Hyderabad.
3. Highway Engineering – Dr.S.K.Sharma, S.Chand Publishers

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Subject Code	Title of the Subject	L	T	P	C
	GEOTECHNICAL ENGINEERING – II	2	1	0	3

COURSE OBJECTIVE:
The objectives of this course are:

1	To enable the student to determine different soil exploration techniques.
2	To enable the student to determine the earth slope stability.
3	To enable the student to estimate earth pressure using various theories.
4	To enable the student to estimate the contact pressure distribution below shallow footing and allowable bearing pressure.
5	To enable the student to analyze the load carrying capacity of pile foundation and well foundation.

COURSE OUTCOMES
On completion of the course, the students will be able to:

1	Understand different soil exploration techniques.
2	Analyze the earth slope stability.
3	Estimate earth pressure using various theories.
4	Estimate the contact pressure distribution below shallow footing and allowable bearing pressure.
5	Analyze the load carrying capacity of pile foundation and well foundation.

UNIT – I

SOIL EXPLORATION: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – Planning of Programme and preparation of soil investigation report.

UNIT – II

EARTH SLOPE STABILITY: Infinite and finite earth slopes – Types of failures – Factor of safety of infinite slopes – Stability analysis by Swedish arc method, standard method of slices, Bishop‘s Simplified method – Taylor‘s Stability Number- Stability of slopes of earth dams under different conditions.

UNIT – III

EARTH PRESSURE THEORIES: Rankine‘s theory of earth pressure – Earth pressures in layered soils – Coulomb‘s earth pressure theory – Rebhann‘s and Cullman‘s graphical method

RETAINING WALLS: Types of retaining walls – stability of retaining walls.

UNIT – IV

SHALLOW FOUNDATIONS: Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff‘s and Skempton`s Methods

ALLOWABLE BEARING PRESSURE: Safe bearing pressure based on N- value – Allowable bearing pressure; safe bearing capacity and settlement from plate load test – Allowable settlements of structures – Settlement Analysis

UNIT –V

PILE FOUNDATION: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

WELL FOUNDATIONS: Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts.

TEXT BOOKS:

1. Geotechnical Engineering by C.Venkataramaiah, New Age Pubilications.
2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi
3. Soil Mechanics and Foundations by – by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCES:

1. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
2. Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson Engineering
3. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
4. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
5. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.
6. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

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Subject Code	Title of the Subject	L	T	P	C
	English Language Skills	3	0	0	3

Course Description:
English Language Skills aims to enable the engineering students to meet the demands of the modern job market through thorough training in LSRW skills, presentation skills, interview skills, academic writing etc. Students of our region have knowledge of their respective subjects, but the surveys make it clear that they are lagging behind in expressing themselves effectively in a professional setting. So this course will enable them to hone these skills and excel in their respective fields.

COURSE OBJECTIVES	
1	To develop awareness in students of the relevance and importance of technical communication and presentation skills.
2	To prepare the students for placements
3	To sensitize the students to the appropriate use of non-verbal communication
4	To train students to use language appropriately for presentations and interviews
5	To enhance the documentation skills of the students with emphasis on formal and informal writing

COURSE OUTCOMES	
CO1	To recall and memorize the basic concepts of effective communication
CO2	To understand the various components of effective communication.
CO3	To apply writing skills in order to meet the demands of work place environment.
CO4	To analyze verbal and non-verbal interpretations in multicultural context.
CO5	To evaluate different aspects of verbal and linguistic competence to become effective presenters.
CO6	To design and develop an effective written documents in technical domain.

UNIT 1: LSRW SKILLS

Introduction to LSRW Skills – Definition – Importance of LSRW Skills - Advantages and Disadvantages of Oral and Written Skills – Advantages and disadvantages of Written & Speaking skills - Barriers to effective communication

OUTCOMES
To recall and memorize the basic concepts of LSRW skills
To understand the various components of oral and written skills
To apply English language skills to avoid barriers to effective communication

UNIT II: VERBAL & NON-VERBAL SKILLS

Informal and Formal Conversation - Non-verbal Skills–Kinesics, Proxemics, Chronemics, Haptics, Oculesics ,Paralinguistic features – Body language for interviews

To understand the basic components of non-verbal communication.
To apply the knowledge of the difference between informal and formal conversation in order to meet the demands of work place environment.
To analyze non-verbal interpretations in multicultural context.

UNIT III: ACADEMIC WRITING SKILLS

Writing Skills–Art of condensation- summarizing and paraphrasing - Abstract Writing, Synopsis Writing – Formal Letter Writing - Report Writing

To understand the basic components of written communication.
To apply knowledge of different formats of written communication needed in work place environment.
To analyze the structure of letters, reports etc.

UNIT IV: CREATIVE WRITING SKILLS

Film Review Writing – Creative Writing- Short Story Writing – Speeches for academic settings – Writing Skits – Script for Short Films/Web Series

To apply writing skills in creative writing to meet the demands of documentation in professional life
To analyze different figures of speech in creative writing
To evaluate different aspects creative and academic writing to become effective at written communication

UNIT V: PROFESSIONAL SPEAKING SKILLS

Job Interviews –Types of Job Interviews – Characteristics of a job interview - Interview Preparation Techniques –How to overcome Stage fright
Group Discussions(GD): Importance of Group Discussion- Characteristics of a GD - GD as a tool for selection – GD Strategies – Do's & Don't of GD - GD Vs Debates

To analyze the different aspects of interviews and group discussions
To evaluate the group dynamics to excel in group discussions
To design and develop strategies to answer effectively in interviews

Text Books:

1. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma,3rd Edition, O U Press 2015

References:

1.Communication Skills by Pushpalatha& Sanjay Kumar, Oxford Univsesity Press
2.Books on **TOEFL/GRE/GMAT/CAT/IELTS** by Barron's/DELTA/Cambridge University Press.2012.
3. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.
4. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
5. **Successful Presentations** by John Hughes & Andrew Mallett, Oxford.
6. **Winning at Interviews** by Edgar Thorpe and Showick Thorpe, Pearson
7. Winning Resumes and Successful Interviews by Munish Bhargava, Mc Graw Hill

WEB LINKS

1. **https://blog.allaboutlearningpress.com/listening-comprehension/**
2. **https://www.englishclub.com/**
3. **https://www.helpguide.org/articles/relationships-communication/nonverbal-communication.htm**
4. **https://www.slideshare.net/poojavrs/lsrw-109040479**
5. https://www.slideshare.net/nandapalit/non-verbal-verbal-communication
6. https://www.slideshare.net/madeehasaeed96/writing-skills-71430610
7. https://www.slideshare.net/rhinautan/creative-writing-76208225
8. https://www.slideshare.net/vikkerkar/interview-skills-presentation
9. https://www.slideshare.net/ritikadhameja/group-discussion-46255658

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Subject Code	Title of the Subject	L	T	P	C
	PRESTRESSED CONCRETE (PEC-II)	3	0	0	3

COURSE OBJECTIVES

The objectives of this course are:

1	Understand the principles & necessity of prestressed concrete structures
2	Get the knowledge on various losses of prestress.
3	Analyse PSC beams with straight, concentric, eccentric, bent and parabolic tendons anddesign beams of rectangular and I section for flexure.
4	Design shear reinforcements, structural elements for shear, torsion and anchorage as perthe provisions of BIS.
5	Interpret the transmission mechanism of pre-stressing force by bond and compute deflection of beams under loads

COURSE OUTCOMES

On completion of the course, the students will be able to:

CO1	Understand the concepts of pre-stressing and methods of pre stressing.
CO2	Compute losses of pre-stress in pre-stressed concrete members.
CO3	Design PSC beams under flexure and shear..
CO4	Estimate the short- and long-term deflections of PSC beams.
CO5	Apply prestressing concepts for composite beams.

UNIT -I

Introduction:

Principles of pre-stressing – Pre stressing systems - Pre-tensioning and post tensioning- Advantages and limitations of Pre stressed concrete- Need for high strength materials. Methods of pre-stressing: Pre-tensioning (Hoyer system) and Post-tensioning methods (Freyssinet system and Gifford- Udall System).

UNIT –II

Losses of pre-stress:

Loss of pre-stress in pre-tensioned and post-tensioned members due to elastic shortening, shrinkage and creep of concrete, relaxation of stress in steel, anchorage slip and frictional losses.

UNIT -III

Flexure and shear:

Analysis of beams for flexure and shear - Beams pre-stressed with straight, concentric, eccentric,

bent and parabolic tendons- Kern line - Cable profile - Design of PSC beams (rectangular and I sections) using IS 1343. Analysis and design of rectangular and I beams for shear. Introduction to Transmission length and End block (no Design and Analytical problems).

UNIT – IV

Deflections:

Control of deflections- Factors influencing deflections - Short term deflections of uncracked beams- Prediction of long time deflections.

UNIT – V

Composite beams:

Different Types- Propped and Un-propped- stress distribution- Differential shrinkage- Analysis of composite beams.

TEXT BOOKS:

1. N. Krishna Raju, ‒Prestressed Concrete‖, Tata Mc.Graw Hill Publications.
2. Praveen Nagrajan, ‒Prestressed Concrete Design‖, Pearson publications, 2013.

REFERENCES:

1. T.Y. Lin & Ned H. Burns, ―Design of Prestressed Concrete Structures‖, John Wiley & Sons.
2. Ramamrutham, ‒Prestressed Concrete‖, Dhanpatrai Publications.
3. Rajagopalan, ‒Prestressed concrete‖, Narosa Publishing House.
4. BIS code on ‒prestressed concrete‖, IS: 1343 to be permitted into the examination Hall.

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Subject Code	Title of the Subject	L	T	P	C
	EXPANSIVE SOILS (PEC-II)	3	0	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1	Familiarize Students with Nature of Soils and Soil Structure
2	Equip student with concepts of Swelling and methods of determination
3	Understand foundation practices in expansive soils
4	Familiarize different materials and techniques for stabilization
5	Understand procedure to improve shear strength of expansive soils

COURSE OUTCOMES:

At the end of this course the student will be able to

1.	Demonstrate behavior of expansive soils.
2.	Explain need of foundation practice on expansive soils. Perform methods of stabilization of expansive soils .
3.	Select additives and methodology for stabilization.
4.	Apply the gained knowledge for suitable performance
5.	Understand procedure to improve shear strength of expansive soils

UNIT – I

Clay Mineralogy: Nature of Soils-Clay mineral structure- Diffused double layer theory- Cation exchange – Soil water- Soil Structure-Soil water interaction

UNIT- II

Swelling Characteristics- Swelling- Factors effecting Swelling- Swelling Potential- Swell Pressure- Methods of Determination-Factors effecting Swelling potential and swell pressure- Heave- Factors effecting Heave- Methods of determination of heave.

UNIT-III

Foundation Practices in Expansive Clays: Sand Cushion-Belled Piers-CNS layer technique- Under reamed Pile foundation- Construction Techniques- Design Specifications- Load-carrying capacity in compressive and uplift of single and multi under reamed piles in clays and sands- Granular pile Anchors.

UNIT-IV

Stabilization:

Stone columns - Lime Slurry pressure injection & Stabilization with admixtures-Propounding-

Vertical and Horizontal Moisture barriers.

UNIT: V

Shear strength of expansive soils: Kati‘s concept of bilinear envelope- Stress –State variables in partially saturated soil s-Frelend‘s strength parameters- Determination of matrix suction by filter paper method- Axis translation technique and field suction measurement.

TEXT BOOKS:

1. F. C. Chen, ―Foundation on Expansive Soils‖, Elsevier Scientific Publishing Company, Newyork
2. J. D. Nelson and D. I. Miller, ―Expansive soils- Problems and Practice in Foundation and pavement Engineering‖, John Wiley & Sons Inc

REFERENCES:

1. D. G. Fredlund and H. Rhardjo, ―Soil Mechanics for Unsaturated Soils‖, WILEY Inter Science Publication, John Wiley & Sons, Inc
2. D. R. Katti, A. R. Katti, ―Behavior of Saturated Expansive Soils and Control Methods‖, Taylor and Francis
3. Malcolm D Bolton , ―Guide to Soil Mechanics‖, Universities Press, 2003.
4. Manfred R. Haussmann, ―Engineering Principles of Ground Modification‖, McGraw Hill Pub. Co.,New,York, 1990

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Subject Code	Title of the Subject	L	T	P	C
	Repair and Rehabilitation of Structures **(PEC-II)**	3	0	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1	To learn various distress and damages to concrete and masonry structures
2	To understand the importance of maintenance of structures
3	To asses the damage to structures using various tests
4	To study the various types and properties of repair materials
5	To learn various repair techniques of damaged structures, corroded structures

COURSE OUTCOMES

On completion of the course, the students will be able to:

CO1	Understand t h e corrosion effects
CO2	Understand the causes of deterioration in structures
CO3	Assess the damaged structures using NDT techniques
CO4	Understand the surface repair of structures
CO5	Identify different types of strengthening and stabilization techniques used for existing structures

Unit – I

Introduction, significance of corrosion, and corrosion mechanisms - Embedded metal corrosion

Unit – II

Deterioration of cementations systems – Sulphate and Acid attack - Alkali Silica Reaction (ASR), Shrinkage, and others

Unit – III

Concrete assessment using non-destructive tests (NDT) - : Concrete assessment and load effects

Unit – IV

Surface repair – Condition assessment – Analysis, strategy, and design – Material requirement, surface preparation, placement of repair material

Unit – V

Strengthening and stabilization -Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake-Transportation of Structures from one place to other -Structural Health Monitoring- demolition techniques-Engineered demolition methods-Case studies, Study of structural conditions of heritage buildings.

Text Books and references

1. Concrete Repair and Maintenance‖ by Peter H. Emmons, R.S. Means Company, Kingston, MA, USA.
2. –Maintenance Repair & Rehabilitation & Minor Works of Buildings‖ P.C. Varghese, PHI Learning Pvt. Ltd., New Delhi.
3. –Concrete Repair to EN1504 – Diagnosis, Design, Principles and Practice‖ Michael Raupach and Till Buttner, CRC Press., Taylor and Francis Group, Boca Raton, FL, USA
4. –Concrete Structures – Protection, Repair and Rehabilitation‖ R. Dodge Woodson, Butterworth-Heinemann – Elsevier, UK

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Subject Code	Title of the Subject	L	T	P	C
	INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT (OEC-II)	3	0	0	3

COURSEOBJECTIVES:

The objectives of this course are:

1	To distinguish between the quality of domestic and industrial water requirements and Wastewater quantity generation.
2	To Know the industrial process, water utilization and waste water generation.
3	To Impart knowledge on selection of treatment methods for industrial wastewater.
4	To acquire the knowledge on operational problems of common effluent treatment plants.
5	To gain knowledge on different techniques and approaches for minimizing the generation and application of Physio-chemical and biological treatment methods for recovery, reuse and disposal of industrial wastewater.

COURSE OUTCOMES:

On completion of the course, the students will be able to:

1	Distinguish between the quality of domestic and industrial water requirements and Wastewater quantity generation.
2	Understand the industrial process, water utilization and waste water generation
3	Acquire the knowledge on operational problems of common effluent treatment plants.
4	Impart knowledge on selection of treatment methods for industrial wastewater.
5	Understand the modern techniques skills and tools including computer applications,necessary for engineering practice.

UNIT – I:

Sources of Pollution - Physical, Chemical, Organic & Biological properties of Industrial Wastes - Difference between industrial & municipal waste waters - Effects of industrial effluents on sewers and Natural water Bodies.

UNIT – II:

Pre & Primary Treatment - Equalization, Proportioning, Neutralization, Oil separation by Floating-Waste Reduction-Volume Reduction-Strength Reduction.

UNIT-III:

Waste Treatment Methods - Nitrification and De-nitrification-Phosphorous removal -Heavy metal removal - Membrane Separation Process - Air Stripping and Absorption Processes - Special Treatment Methods - Disposal of Treated Waste Water.

UNIT-IV:

Characteristics and Composition of waste water and Manufacturing Processes of Industries like Sugar, Characteristics and Composition of Industries like Food processing Industries, Steel, and

Petroleum Refineries.

UNIT-V:

Characteristics and Composition of Industries like Textiles, Tanneries, Atomic Energy Plants and other Mineral Processing Industries – Joint Treatment of Raw Industries waste water and Domestic Sewage – Common Effluent Treatment Plants(CETP) – Location, Design, Operation and Maintenance Problems – Economical aspects.

TEXTBOOKS:

1. Metcalf & Eddy, –Wastewater engineering Treatment disposal reuse‖, Tata McGraw Hill.
2. Eckenfelder, W.W., –Industrial Water Pollution Control‖, McGraw-Hill

REFERENCE BOOKS:

1. M.N. Rao and Dutta – Industrial Waste.
2. Mark J. Hammer, Mark J. Hammer, Jr., –Water & Wastewater Technology‖, Prentice Hall of India.
3. N.L. Nemerrow –Theories and practices of Industrial Waste Engineering.
4.C.G. Gurnham –Principles of Industrial Waste Engineering.

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Subject Code	Title of the Subject	L	T	P	C
	INTELLECTUAL PROPERTY RIGHTS (OEC-II)	3	0	0	3

COURSE OBJECTIVES

The objectives of this course are:

1	Understanding, defining &differentiating types of intellectual properties (ips) and their roles in contributing to organizational competitiveness.
2	Understanding the frame work of strategic management of intellectual property
3	Appreciating and appraising different IP management approaches and describing how pioneering firms intiate, implement and manage IPM programs
4	Explaining how to derive value from IP and leverage its value in new product and service development
5	Exposing to the Legal management of IP and understanding of real life practice of IPM

COURSE OUTCOMES:

On completion of the course, the students will be able to:

1.	Identify different types of intellectual properties (IPS), the right of ownership, scope of protection as well as the ways to create and to extract value from IP
2.	Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
3.	Identify activities and constitute IP infringements and the remedies available to the IPowner and describe the precautions to be taken to infringement of proprietary rights in products and technology development
4.	Be familiar with the processes of Intellectual property Management (IPM) and various approaches for IPM and conducting IP and IPM auditing and explain how IP can bemanaged as a strategic resource and suggest IPM strategy.
5.	Be able to anticipate and subject to critical analysis arguments relating to the developmentand reform of Intellectual property right institutions and their likely impact on creativity and innovation.

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, International organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secretes law, determination of trade secretes status, liability for misappropriations of trade secrets, and protection for submission, trade secretes litigation.Unfair competition: Misappropriation right of publicity, False advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah. E. Bouchoux, cengagelearing.
2. Intellectual property right – nleashmy the knowledge economy, prabuddhaganguli,
Tate Mc Graw Hill Publishing company ltd.,

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SubjectCode	Title of the Subject	L	T	P	C
	Green buildings (OEC-II)	3	0	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1.	Exposure to the green building technologies and their significance.
2.	Understand the judicial use of energy and its management.
3.	Educate about the Sun-earth relationship and its effect on climate.
4.	Enhance awareness of end-use energy requirements in the society.
5.	Develop suitable technologies for energy management

COURSE OUTCOMES:

On completion of the course, the students will be able to:

1	Understand the fundamentals of energy use and energy processes in building
2	Identify the energy requirement and its management.
3	Know the Sun-earth relationship vis-a-vis its effect on climate.
4	Be acquainted with the end-use energy requirements.
5	Be familiar with the audit procedures of energy.

UNIT – 1:

Introduction What is Green Building, Why to go for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, What are key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

UNIT – 2:

Green Building Concepts And Practices Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities And Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

UNIT-3:

Green Building Design Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximize System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks,

Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement,

UNIT- 4:

Air Conditioning Introduction,CII Godrej Green business centre, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection, pump selection, Selection of cooling towers, Selection of air handing units,Precooling of fresh air, Interior lighting system, Key feature of the building. Eco-friendly captive power generation for factory, Building requirement.

UNIT –5:

Material Conservation Handling of non process waste, waste reduction during construction, materials with recycled content, local materials, material reuse, certified wood ,Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels,

Text Books:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.
2. Green Building Hand Book by Tomwoolley and Samkimings, 2009.
3. Complete Guide to Green Buildings by Trish riley
4. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009
5. Energy Conservation Building Code –ECBC-2020, published by BEE

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Subject Code	Title of the Subject	L	T	P	C
	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	3	0	0	3

COURSE OBJECTIVES: The objective of this course is	
1	To inculcate the basic knowledge of micro economics and financial accounting
2	To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
3	To know the various types of Market Structures & pricing methods and its strategies
4	To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
5	To provide fundamental skills on Accounting and to explain the process of preparing Financial statements

COURSE OUTCOMES: At the end of the course, students will be able to	
CO1	Understand the fundamentals of Economics and Managerial economics viz., Demand, Production, cost, revenue and markets
CO2	Apply the Concept of Production cost and revenues for effective Business decision
CO3	Analyze how to invest their capital and maximize returns.
CO4	Evaluate the capital budgeting techniques
CO5	Develop the accounting statements and evaluate the financial performance of business entity.

UNIT-I:Managerial Economics

Introduction – Nature, meaning, significance, functions and advantages. Demand-Concept, Function, Law of Demand - DemandElasticity- Types – Measurement. Demand Forecasting-Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

LEARNING OUTCOMES: At the end of the Unit, the learners will be able to

State the Nature of Managerial Economics and its importance

- Understand the concept of demand andits determinants
- Analyze the Elasticity and degree of elasticity
- EvaluateDemand forecasting methods
- Design the process of demand estimation for different types of demand

UNIT-II: Production and Cost Analysis

Introduction – Nature, meaning, significance, functions and advantages. Production Function–

Least-cost combination– Shortrun and longrun Production Function- Isoquants andIsocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale.Cost&Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

LEARNING OUTCOMES: At the end of the Unit, the learners will be able to

- Define the production function, Input-Output relationship and different cost concepts
- Apply the least-cost combination of inputs
- Analyze the behavior of various cost concepts
- Evaluate BEA for real time business decisions
- Develop profit appropriation for different levels of business activity

UNIT-III: Business Organizations and Markets

Introduction – Nature, meaning, significance, functions and advantages.Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises.Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition – Monopoly-Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies.

LEARNING OUTCOMES: At the end of the Unit, the learners will be able to

- Explain the structure of markets, features of different markets and forms of business organizations
- Apply the price output relationship in different markets
- Analyze the optimum output levels to maximize profit in different markets
- Evaluate price-output relationship to optimize cost,revenue and profit

UNIT- IV:Capital Budgeting

Introduction – Nature, meaning, significance, functions and advantages. Typesof Working Capital,Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals,Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

LEARNING OUTCOMES: At the end of the Unit, the learners will be able to

- Explain the concept of capital budgeting and its importance in business
- Contrast and compare different investment appraisal methods
- Analyze the process of selection of investment alternatives using different appraisal methods
- Evaluate methods of capital budgeting for investment decision making and for maximizing returns
- Design different investment appraisals and make wise investments

UNIT-V: Financial Accounting and Analysis

Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions-

Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). ***Financial Analysis*** - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

LEARNING OUTCOMES: At the end of the Unit, the learners will be able to

- Discuss the concept,convention and significance of accounting
- Apply the fundamental knowledge of accounting while posting the journal entries
- Analyze the process and preparation of final accounts and financial ratios
- Evaluate the financial performance of an enterprise by using financial statements

Text Books:

1. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019

References:

1. Ahuja Hl Managerial economics Schand,3/e,2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.

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Subject Code	Title of the Subject	L	T	P	C
	ENTREPRENEURSHIP& INCUBATION	3	0	0	3

COURSE OBJECTIVES: The objective of this course is	
1	To make the student understand about Entrepreneurship
2	To enable the student in knowing various sources of generating new ideas in setting up ofnew enterprise
3	To facilitate the student in knowing various sources of finance in starting up of a business
4	To impart knowledge about various government sources which provide financial assistance to entrepreneurs/ women entrepreneurs
5	To encourage the student in creating and designing business plans

COURSE OUTCOMES: At the end of the course, students will be able to	
1	Define the Concepts related to the Entrepreneurship and Incubators
2	Understand the concept of Entrepreneurship and challenges in the world of competition.
3	Apply the Knowledge in generating ideas for New Ventures.
4	Analyze various sources of finance and subsidies to entrepreneur/women Entrepreneurs.
5	Evaluate the role of central government and state government in promoting Entrepreneurship.
6	Create and design business plan structure through incubations.

UNIT-I: Entrepreneurship

Introduction-Nature, meaning, significance, functions and advantages. concept, characteristics-knowledge and skills requirement - process - Factors supporting entrepreneurship - Differences between Entrepreneur and Intrapreneur - entrepreneurial mindset and personality - Recent trends.

LEARNING OUTCOMES

At the end if the Unit, the learners will be able to

- Understand theconcept of Entrepreneur and Entrepreneurship in India
- Analyzerecent trends in Entrepreneurship across the globe
- Develop a creative mind set and personality in starting a business.

UNIT-II: Women Entrepreneurship

Introduction – Nature, meaning, significance, functions and advantages. Growth of women entrepreneurship in India. - Issues & Challenges - Entrepreneurial motivations. Entrepreneurship Development and Government. Role, of Central and State Government - incentives, subsidies andgrants – Export-oriented Units - Fiscal and Tax concessions.

LEARNING OUTCOMES

At the end of the Unit, the learners will be able to

- Understand the role of government in promoting women entrepreneurship
- Analyze the role of export-oriented units
- Evaluate the tax concessions available for Women entrepreneurs

UNIT-III:Product Development

Introduction – Nature, meaning, significance, functions and advantages. Startup Initiatives - Generating business/ Service idea – Sources and methods –Identifying opportunities - Feasibility study - Market feasibility, technical/operational feasibility, Financial feasibility. Developing business plan, Preparing project report, Presenting business plan to investors.

LEARNING OUTCOMES

At the end if the Unit, the learners will be able to

- Analyze the sources of new methods in generating business idea
- Evaluate market feasibility, financial feasibility and technical feasibility
- Design and draw business plansin project preparation and prepare project reports

UNIT-IV:Startups

Introduction – Nature, meaning, significance, functions and advantages. Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation and the business incubator and how they operate and influence theType/benefits of incubators - Corporate/educational / institutional incubators - Broader business incubation environment - Pre-Incubation and Post - Incubation process - Idea lab, Business plan structure -Value proposition

LEARNING OUTCOMES

At the end of the Unit, the learners will be able to:

- Understand the importance of business incubation
- Apply brilliant ideas in the process of business incubation
- Analyze the process of business incubation/incubators.
- Design their own business incubation/incubators as viable-business unit.

UNIT-V: Finance

Introduction – Nature, meaning, significance, functions and advantages. Sources - Long term and Short term - Institutional Finance – Commercial Banks, SFC's and NBFC's in India, Role in small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions supporting entrepreneurship development.

LEARNING OUTCOMES

At the end of the Unit, the learners will be able to

- Understand the various sources of finance in Starting the new venture
- Analyze the role of banks and other financial institutions in promoting entrepreneurship in India
- Evaluatethe need and importance of MSMEs in the growth of country

TEXT BOOKS

1. D F Kuratko and T V Rao, **Entrepreneurship** - A South-Asian Perspective –
Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit :login.cengage.com)
2 .Nandan H, Fundamentals of Entrepreneurship, PHI, 2013

REFERENCES

1.Vasant Desai,Small Scale Industries and Entrepreneurship, Himalaya
Publishing 2012.
2. Rajeev Roy Entrepreneurship, 2nd Edition, Oxford, 2012.
3.B.JanakiramandM.Rizwana‖ Entrepreneurship Development: Text &
Cases, Excel Books, 2011.
4.Stuart Read, Effectual Entrepreneurship, Routledge, 2013.

E-RESOURCES

1. Entrepreneurship-Through-the-Lens-of-enture Capital
2.http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship
3.http://nptel.ac.in/courses/122106032/Pdf/7_4.pd
4.http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurhip/50

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Subject Code	Title of the Subject	L	T	P	C
	BUSINESS ETHICS AND CORPORATE GOVERNANCE	3	0	0	3

COURSE OBJECTIVES : The objectives of this course are	
1	To make the student understand the principles of business ethics
2	To enable them in knowing the ethics in management
3	To facilitate the student‘s role in corporate culture
4	To impart knowledge about the fair-trade practices
5	To encourage the student in creating knowingabout the corporate governance

COURSE OUTCOMES: At the end of the course, students will be able to	
CO1	Define the Ethics and Types of Ethics.
CO2	Understand business ethics and ethical practices in management
CO3	Understand the role of ethics in management
CO4	Apply the knowledge in cross cultural ethics
CO5	Analyze law and ethics
CO6	Evaluate corporate governance

UNIT-I:ETHICS

Introduction – Meaning – Nature, Scope, significance, Loyalty, and ethical behavior - Value systems - Business Ethics,Types, Characteristics, Factors, Contradictions and Ethical Practices inManagement- Corporate Social Responsibility – Issues of Management – Crisis Management.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the meaning of loyalty and ethical Behavior
- Explain various types of Ethics
- Analyze the corporate social responsibility of management

UNIT-II: ETHICS IN MANAGEMENT

Introduction Ethics in production,finance,,HumanResourceManagementand,Marketing,Management - Technology Ethics and Professional ethics - The Ethical Value System – Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individual Ethics.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the meaning of Marketing Ethics
- Compare and contrast technical ethics and professional ethics
- Develop ethical values

UNIT-III: CORPORATE CULTURE

Introduction, Meaning,definition,Nature, Scope, Functions,andsignificance– Cross cultural issues in Ethics - - Emotional Honesty – Virtue of humility – Promote happiness – karma yoga – proactive – flexibility and purity of mind. The Ethical Value System – Universalism, Utilitarianism, Distributive

Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individual Ethics.

LEARNING OUTCOMES: -After completion of this unit student will

- Define UniversalismUtilitarianism, Distributive
- Understand the corporate culture in business
- Analyze Ethical Value System Ethical Values in different Cultures

UNIT- IV:LEGAL FRAME WORK

Law and Ethics, Agencies enforcing Ethical Business Behavior, Legal Impact– Environmental Protection, Fair Trade Practices,legal Compliances, Safeguarding Health and wellbeing of Customers.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand Law and Ethics
- Analyze Different fair-trade practices
- Make use of Environmental Protection andFair-Trade Practices

UNIT -V : CORPORATE GOVERNANCE

Introduction, meaning – scope Nature - Issues, need, corporate governance code, transparency & disclosure, role of auditors, board of directors and shareholders. Global issues, accounting and regulatory frame work, corporate scams, committees in India and abroad, corporate social responsibility. of BODs composition, Cadbury Committee - various committees - reports - Benefits and Limitations.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand corporate governance code
- Analyze role ofauditors, board of directors and shareholders in corporate governance
- Implementing corporatesocialresponsibility in India.

Text books.

1. Murthy CSV: Business Ethics and Corporate Governance, HPH

2. Bholananth Dutta, S.K. Podder – Corporation Governance, VBH.

Reference books

1. Dr. K. Nirmala, KarunakaraReaddy : Business Ethics and Corporate Governance, HPH
2. H.R.Machiraju: Corporate Governance
3. K. Venkataramana, Corporate Governance, SHBP.
4. N.M.Khandelwal : Indian Ethos and Values for Managers

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Subject Code	Title of the Subject	L	T	P	C
	ENVIRONMENTAL ENGINEERING LAB	0	0	3	1.5

Course Objectives:

1.	The object of the course is to enable the students to identify the characteristics of water sample.

Course Outcomes:

At the end of the course, the student will be able to:

1.	Understand about quality of water and purification process
2.	Select appropriate technique for treatment of waste water.
3.	Assess the impact of air pollution
4.	Understand consequences of solid waste and its management.
5.	Design domestic plumbing systems.

LABORATORY EXPERIMENTS

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Determination and estimation of Total Hardness–Calcium & Magnesium.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides in water and soil
5. Determination and Estimation of total solids, organic solids and inorganic solids and settleable solids by Imhoff Cone.
6. Determination of Iron.
7. Determination of Dissolved Oxygen with D.O. Meter &Wrinklers Method and B.O.D.
8. Determination of N, P, K values in solid waste
9. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.
10. Determination of C.O.D.
11. Determination of Optimum coagulant dose.
12. Determination of Chlorine demand.
13. Presumptive Coliform test.

TEXT BOOKS:

1. G. S. Birdi –Water supply and sanitary Engineering‖, Dhanpat Rai & Sons Publishers.
2. Peavy, H.S, Rowe, D. R. Tchobanoglous, –Environmental Engineering‖, Mc-Graw –Hill International Editions, New York 1985.

REFERENCES:

1. B.C. Punmia, Ashok Jain & Arun Jain, –Water Supply Engineering, Vol. 1, Waste water Engineering, Vol. II‖, Laxmi Publications Pvt. Ltd, New Delhi.
2. MetCalf and Eddy. –Wastewater Engineering, Treatment, Disposal and Reuse‖, Tata McGraw-Hill, New Delhi.
3. S. M. Patil, ―Plumbing Engineering. Theory, Design and Practice‖,1999.K. N. Duggal, ―Elements of environmental engineering‖, S. Chand Publishers.

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Subject Code	Title of the Lab	L	T	P	C
	English Language Skills Lab	0	0	3	1.5

Course Description:
English Language Skills Lab aims to enable the engineering students to meet the demands of the modern job market through group activities, individual presentations, mock interviews and group discussions. Students of our region have knowledge of their respective subjects, but the surveys make it clear that they are lagging behind in expressing themselves effectively in a professional setting. So, this course will enable them to hone these skills and excel in their respective fields.

COURSE OBJECTIVES	
1	To improve the students‘ fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2	Further, they would be required to communicate their ideas relevantly and coherently in writing.
3	To prepare all the students for their placements.
4	To initiate them into greater use of the computer in resume preparation, report writing, format making etc.
5	To train them to use language effectively to face interviews, group discussions, public speaking.

COURSE OUTCOMES	
CO1	To recall and memorize tips to communicate effectively
CO2	To understand various listening components that includes listening comprehension of gist and detailed information.
CO3	To apply extensive and intensive reading methods for specific reading and voracious reading of vast material.
CO4	To analyzedifferentdescriptive and technical writing material.
CO5	To evaluate and develop, academic research paper with appropriate citations, quotations, and references when needed.
CO6	To develop communicative competency and make the students job ready

UNIT-I: COMMUNICATIVE COMPETENCY

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary for competitive purpose

OUTCOMES:

- To recall and memorize the basic concepts of reading and listening skills
- To understand the various components to build up vocabulary
- To apply English language skills to avoid barriers to effective reading and listening

UNIT-II: TECHNICAL WRITING

1. Email Writing
2. CV/Resume Writing
3. Mini Project Writing

OUTCOMES:

- To understand the basic components of writing Emails
- To apply the knowledge of writing eye catching resumes
- To analyze different ways of writing a mini project

UNIT-III: ORAL PRESENTATION SKILLS

1. Self-Introduction – Introducing Others – Welcome Speech – Vote of Thanks
2. Oral Presentation-Individual/Impromptu Speeches/ JAM
3. Stage Dynamics– Barriers to Effective Presentation

OUTCOMES:

- To understand the basic components of speeches
- To apply knowledge of different forms of presentation.
- To analyze stage dynamics for effective presentation

UNIT-IV: TECHNICAL**PRESENTATION SKILLS**

1. Information Transfer
2. PPT Presentation
3. Poster Presentation

OUTCOMES:

- To apply knowledge of different types of pictograms to transfer the information
- To analyze the techniques of preparing PPTs
- To evaluate different skills in poster presentation

UNIT-V: PROFESSIONAL SKILLS

1. Group discussions-II
2. Interview skills
3. Answering Strategies

OUTCOMES:

- To analyze the different aspects of interviews and group discussions
- To evaluate the group dynamics to excel in group discussions
- To design and develop strategies to answer effectively in interviews

MINIMUM REQUIREMENT FOR ELCS LAB:

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

SUGGESTED SOFTWARE:

1. Orell: Language Lab Software
2. Clarity Pronunciation Power – Part I (Sky Pronunciation)
3. Clarity Pronunciation Power – part II
4. LES(Learn English Select) by British council
5. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
6. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
7. Cambridge Advanced Learners' English Dictionary with CD.

The software consisting of the prescribed topics elaborated above should be procured and used.

REFERENCE BOOKS

1. **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
2. **TOEFL &GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
3. **Train2success.com**

1. **Objective English for Competitive Exams**, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.

2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, O U Press 2009.
3. Books on **TOEFL/GRE/GMAT/CAT/IELTS** by Barron's/DELTA/Cambridge University Press.2012.
4. **Handbook for Technical Writing** by David A McMurrey& Joanne Buckely CENGAGE Learning 2008.
5. **English for Technical Communication for Engineering Students, AyshaVishwamohan, Tata Mc Graw-Hill 2009.**
6. **Word Power Made Handy,** Shalini Verma, S Chand Publications, 2011.
7. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011.

WEB LINKS

1.https://www.slideshare.net/ruschellecossid/reading-comprehension-56872438
2.https://www.slideshare.net/FiveEEE/listening-comprehension-40031081
3.https://www.slideshare.net/shrutisalunkhe2/english-for-competitive-exams
4.https://www.slideshare.net/nidhipandey16/email-writing-52942112
5.https://www.slideshare.net/aamirmuhammadaamir77/resume-writing-ppt
6.https://www.powershow.com/view/1d8cf2-OWFhN/Mini_Project_Report_Writing_Workshop_powerpoint_ppt_presentation
7.https://www.slideshare.net/8788902/oral-presentations-28994496
8.https://www.slideshare.net/nandapalit/presentation-skills-33500438
9.https://www.slideshare.net/ritikadhameja/group-discussion-46255658
10.https://www.slideshare.net/vikkerkar/interview-skills-presentation

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Subject Code	Title of the Subject	L	T	P	C
	CONSTITUTION OF INDIA	3	0	0	0

COURSE OBJECTIVES : The objective of this course is	
1	To Enable the student to understand the importance of constitution
2	To understand the structure of executive, legislature and judiciary
3	To understand philosophy of fundamental rights and duties
4	To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
5	To understand the central-state relation in financial and administrative control

COURSE OUTCOMES: At the end of the course, students will be able to	
1	State the historical background of the constitution making and its importance for building a democratic India.
2	Understand the functioning of three wings of the governmentie., executive, legislative and judiciary.
3	Demonstrate the value of the fundamental rights and duties for becoming good citizen of India.
4	Analyze the decentralization of power between central, state and local self-government
5	Appraise the knowledge in strengthening of the constitutional institutions like CAG,Election Commission and UPSC for sustaining democracy.
6	Develop themselves as responsible citizens and pave way to build a democratic country.

UNIT-IIntroduction to Indian Constitution

Constitution -Meaning of the term - Indian Constitution- Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy.

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History and features of Indian constitution
- Learn about Preamble, Fundamental Rights and Duties

UNIT-IIUnion Government and its Administration

Structure of the Indian Union- Federalism - Centre-State relationship – President‘s Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat–LokSabha-RajyaSabha - The Supreme Court and High Court - Powers and Functions

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-IIIState Government and its Administration

Structure of the State Govt. -Governor - Role and Position -CM and Council of Ministers - State Secretariat-Organization Structure and Functions

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the structure of state government
- Analyze the role of Governor and Chief Minister
- Explain the role of State Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IVLocal Administration

District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation PanchayatiRaj - Functions– PRI–ZillaParishath - Elected officials and their roles – CEO, ,ZillaParishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration's role and importance
- Analyze the role of Mayor and elected representatives of Municipalities
- Learn about the role ofZillaParishath block level organization

UNIT-VElection Commission

Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women

LEARNING OUTCOMES:-After completion of this unit student will

- Know the role of Election Commission
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze the role of state election commission
- Evaluate various commissions vizSC/ST/OBC and women

TEXT BOOKS

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi

2. SubashKashyap, Indian Constitution, National Book Trust

REFERENCES:

1. J.A. Siwach, Dynamics of Indian Government & Politics,

2. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)

3. .J.C. Johari, Indian Government andPolitics, Hans India

4. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

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Subject Code	Title of the Subject	L	T	P	C
	FINITE ELEMENT METHODS	2	1	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1.	Implement the basics of FEM to relate stresses and strains
2.	Formulate the design and heat transfer problems with application of FEM.
3.	Solve 1 D, 2 D and dynamic problems using Finite Element Analysis approach
4.	To impart preliminary knowledge of analyzing structures using finite element method.
5.	To learn advanced methods of structural analysis and to apply these methods for analysis of indeterminate structures.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1	Understand the fundamental ideas of FEM.
2	Develop shape functions and stiffness matrices for different elements
3	Generate global stiffness matrices and global load vectors
4	Develop a solution for Iso-parametric elements for 2D analysis
5	Understand the numerical integration and solution techniques in FEM

UNIT-I

Introduction:

Concepts of FEM – Steps involved – Merits & Demerits – Energy principles – Discretization – Rayleigh –Ritz method of functional approximation. Principles of Elasticity: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and

Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT-II

One Dimensional & Two Dimensional Elements: Stiffness matrix for bar element – Shape functions – 1D and 2D elements – Types of elements for plane stress and plane strain analysis – Displacement models – Generalized coordinates – Shape functions – Convergent and

compatibility requirements – Geometric invariance – Natural coordinate system – Area and volume coordinates

UNIT-III

Element stiffness matrix:

Generation of element stiffness and nodal load matrices for 3-node triangular element and four - nodded rectangular elements.

UNIT-IV

Iso-parametric Formulation:

Iso-parametric elements for 2D analysis –Formulation of CST element, 4 – nodded and 8-

noded Iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.AXI-SYMMETRIC ANALYSIS: Basic principles-Formulation of 4-noded iso-parametric Axi-symmetric element.

UNIT-V

Solution techniques:

Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOK:

1. Tirupathi R Chandraputla, ―Finite Element Analysis for Engineering and Technology‖, Universities Press Pvt Ltd, Hyderabad. 2003.
2. C. S. Krishna Murthy,―Finite Element analysis-Theory & Programming‖, Tata Mc.Graw Hill Publishers.

REFERENCES:

1. H.V. Lakshminaryana, ―Finite element analysis and procedures in engineering‖, 3rd edition, Universities press, Hyderabad.
2. Robert D. Cook, Michael E Plesha, Concepts and applications of Finite Element Analysis, John Wiley & sons Publications
3. S. Rajasekharan, ―Finite element analysis in Engineering Design‖, S. Chand Publications, New Delhi.

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Subject Code	Title of the Subject	L	T	P	C
	DESIGN OF STEEL STRUCTURES	2	1	0	3

COURSE OBJECTIVES

The objectives of this course are:

1.	To introduce steel structures and its basic components
2.	To introduce structural steel fasteners like welding and bolting
3.	To design tension members, compression members, beams and beam-columns
4.	To design column splices and bases
5.	To design design the various steel structures.

COURSE OUTCOMES:

On completion of the course, the students will be able to:

CO1	Understand the basic concepts of Steel structures and design of Tension members
CO2	Analyze and Design of compression members
CO3	Analyze and design of beams
CO4	Analyze and design of simple roof truss
CO5	Analyze and design of Plate girder and Grantry girder

UNIT – I

Materials – Making of iron and steel – Types of structural steel – Mechanical properties of steel – Concepts of plasticity – Yield strength. Loads–And combinations loading wind loads on roof trusses, behavior of steel, local buckling. Concept of limit State Design – Different Limit States as per IS 800 -2007 – Design Strengths- Deflection limits – Serviceability - Bolted connections – Welded connections – Design Strength – Efficiency of joint – Prying action Types of Welded joints - Design of Tension members – Design Strength of members.

UNIT – II

Design of compression members – Buckling class – slenderness ratio / strength design – Laced – Battened columns –Column splice – Column base – Slab base.

UNIT – III

Design of Beams – Plastic moment – Bending and shear strength laterally / supported beams design – Built up sections – Large plates Web buckling Crippling and Deflection of beams, Design of Purling.

UNIT – IV

Design of eccentric connections with brackets, Beam end connections – Web angle – Un-stiffened and stiffened seated connections (bolted and Welded types) Design of truss joints

UNIT – V

Plate Girder: Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates stiffeners – splicing and connections.

Gantry Girder: Gantry girder impact factors – longitudinal forces, Design of Gantry girders.

Note: The students should prepare the following plates.

Plate 1 Detailing of simple beams

Plate 2 Detailing of Compound beams including curtailment of flange plates.

Plate 3 Detailing of Column including lacing and battens.

Plate 4 Detailing of Column bases – slab base and gusseted base
Plate 5 Detailing of steel roof trusses including particulars at joints.
Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

TEXT BOOKS

1. limit state design of Steel Structures by Subramanyam.N, Oxford University press, New Delhi
2. Limit State Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi.

REFERENCES

1. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad.
2. Structural design in steel by Sarwar Alam Raz, New Age International Publishers, New Delhi
3. Design of Steel Structures by Edwin Gaylord,CharlesGaylord,JamesStallmeyer, Tata Mc.Graw-Hill, New Delhi.

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Subject Code	Title of the Subject	L	T	P	C
	GROUND IMPROVEMENT TECHNIQUES (PEC-III)	3	0	0	3

COURSE OBJECTIVES

The objectives of this course are:

1	Understand the fundamental concept of ground improvement techniques.
2	Apply knowledge of densification methods.
3	Understand the concepts of stabilization mechanical & chemical methods.
4	Impart knowledge of components of reinforced earth & design of reinforced earth walls.
5	Understanding the identification &foundation techniques.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1.	Understand the Dewatering and grouting techniques
2.	Understand the densification methods used in granular soils and Cohesive soils
3.	Understand the ground Improvement methods used to stabilize soil.
4.	Understand the reinforcement design principles and geosynthetic materials, functions and applications.
5.	Identify the problems in Expansive soils

UNIT – I

DEWATERING: Methods of de-watering- Sumps and interceptor ditches- Single, multi stage well points - Vacuum well points- Horizontal wells-foundation drains-blanket drains - Criteria for selection of fill material around drains –Electro-osmosis .

GROUTING: Objectives of grouting- Grouts and their properties- Grouting methods- ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- Post grout test.

UNIT – II

DENSIFICATION METHODS IN GRANULAR SOILS:-

In – situ densification methods in granular Soils:– Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth.

DENSIFICATION METHODS IN COHESIVE SOILS:–

In – situ densification methods in Cohesive soils:– Preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

UNIT – III

STABILISATION: Methods of stabilization-mechanical-cement- Lime-bituminous-Chemical stabilization with calcium chloride, sodium silicate and gypsum

UNIT – IV

REINFORCED EARTH: Principles – Components of reinforced earth – Factors governing design of reinforced earth walls – Design principles of reinforced earth walls.

GEOSYNTHETICS: Geotextiles- Types, Functions and applications – Geogrids and geomembranes – Functions and applications.

UNIT – V

EXPANSIVE SOILS: Problems of expansive soils – Tests for identification – Methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – Under reamed piles.

TEXT BOOKS:

1. Haussmann M.R. (1990), Engineering Principles of Ground Modification, McGraw-Hill International Edition.
2. Dr.P.Purushotham Raj. Ground Improvement Techniques, Laxmi Publications, New Delhi / University science press, New Delhi
3. NiharRanajan Patra. Ground Improvement Techniques, Vikas Publications, New Delhi

REFERENCES:

1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons,
   New York, USA.

3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercy, USA

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Subject Code	Title of the Subject	L	T	P	C
	TRANSPORTATION ENGINEERING - II (PEC-III)	3	0	0	3

COURSE OBJECTIVE:

The objectives of this course are:

1	Ability to explain the components of permanent way and its components and their functions and requirements.
2	Ability to explain the geometric design elements of Railway track like cant, radius of curve and degree of curve etc..and their design components.
3	Ability to the Aircraft characteristics and their influence on various design elements of an Airport.
4	Ability to explain the concepts of runway orientation, Airport lighting, Airport components and their planning and geometric design of runways and taxiways.
5	Ability to explain the difference between ports and Harbours, types of Ports and Harbours, various facilities needed in Ports and Harbours and NavigationalAids for ships.

COURSE OUTCOMES:
On completion of the course, the students will be able to:

1	Understand the components of permanent way and its components and their functions and requirements.
2	Understand the geometric design elements of Railway track like cant, radius of curve and degree of curve etc..and their design components.
3	understand the Aircraft characteristics and their influence on various design elements of an Airport.
4	Understand the concepts of runway orientation, Airport lighting, Airport components and their planning and geometric design of runways and taxiways.
5	Understand the difference between ports and Harbours, types of Ports and Harbours, various facilities needed in Ports and Harbours and NavigationalAids for ships.

Unit – I

Railway Engineering:

Introduction – Permanent way components – Cross section of permanent way – Functions and requirements of rails, sleepers and ballast – Types of gauges – Creep of rails – Theories related to creep – Coning of wheels – adzing of sleepers – Rail fastenings.

Unit – II

Geometric design of railway track

Gradients – Grade compensation – Cant and negative super elevation – Cant deficiency – Degree of curves – Safe speed on railway track – Points and crossings – Layout and functioning of left hand turn out and right hand turn outs – Station yards – Signaling and interlocking.

Unit –III

Airport Engineering

Airport site selection – Factors affecting site selection and surveys- Runway orientation – Wind rose diagram – basic runway length – Correction for runway length – Terminal area – Layout and functions – Concepts of terminal building – Simple building , Linear concept, pier concept and satellite concept – Typical layouts .

Unit – IV

Geometric design of runways and taxiways

Aircraft characteristics – Influence of characteristics on airport planning and design – Geometric design elements of runway – Standards and specifications - Functions of taxiways – Taxiway geometric design – Geometric elements and standard specifications – Runway and taxiway lighting.

Unit – V

Ports and Harbors

Requirements of ports and harbors – Types of ports – Classification of harbors – Docks and types of docks – Dry docks, wharves and jetties – Breakwaters: layouts of different types of harbors and docks – Dredging operations – navigation aids.

Text books:

1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi.
2. Satish Chandra and Agarwal, M.M. (2007) ‒Railway Engineering‖ Oxford Higher Education, University Press New Delhi.
3. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros.
4. A Text book of Transportation Engineering – S.P.Chandola – S.Chand& Co. Ltd. – (2001).
5. Railway Track Engineering by J.S.Mundrey

References:

1. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian, Scitechpubilishers.
2. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing House Pvt. Limited, 2009
3. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza, Chartor Publishers pvt ltd.

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Subject Code	Title of the Subject	L	T	P	C
	DESIGN AND DRAWING OF IRRIGATION STRUCTURES (PEC-III)	3	0	0	3

Course Objective:

To know the design and drawing aspects of Sloping glacis weir, Tank sluice with tower head, Type III Siphon aqueduct, Surplus weir, Trapezoidal notch fall and Canal regulator.
• Sloping glacis weir.
• Tank sluice with tower head
• Type III Siphon aqueduct.
• Surplus weir.
• Trapezoidal notch fall.
• Canal regulator.
Final Examination pattern: Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

Course Outcomes:

On completion of the course, the students will be able to:

1	Design and draw the plan and cross section of Sloping glacis weir.
2	Design and draw the plan and cross section of Tank sluice with tower head
3	Design and draw the plan and cross section of Type III Syphon aqueduct
4	Design and draw the plan and cross section of Surplus weir.
5	Design and draw the plan and cross section of Trapezoidal notch fall and Canal regulator.

TEXT BOOKS:

1. C.Satyanarayana Murthy, –Design of minor irrigation and canal structures‖, Wiley eastern Ltd.
2. S.K.Garg, –Irrigation engineering and Hydraulic structures Standard‖

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Subject Code	Title of the Subject	L	T	P	C
	AIR POLLUTION AND CONTROL (OEC-III)	3	0	0	3

COURSE OBJECTIVES

The objectives of this course are:

1	To teach the basics of air pollution
2	To impart the behavior of air due to metrological influence
3	To teach the pollutant dispersion models and how to control the particulates
4	To throw light on air quality management
5	To teach the design of air pollution control methods

COURSE OUTCOMES

On completion of the course, the students will be able to:

1	Understand the knowledge of air pollution, sources, types, lapse rate and decreasing measures
2	Understand and analysis air quantity sample and monitoring of pollution
3	Understand the types and nature of air pollutions, the behaviour of flumes andrelevant metrological determinants influencing the dispersion of air pollutants.
4	Learn the design principles of particulate and gaseous control.
5	Evaluate air quantity management and analyse the causes and their effects of air pollutions.

UNIT – I

INTRODUCTION : Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

EFFECTS OF AIR POLLUTION : Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT-II

THERMODYNAMIC OF AIR POLLUTION:

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like Sox, Nox, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion.

PLUME BEHAVIOUR : Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

UNIT-III

POLLUTANT DISPERSION MODELS : Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

CONTROL OF PARTICULATES : Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control, Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV

CONTROL OF GASEOUS POLLUTANTS: General Methods of Control of Nox and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

UNIT – V

AIR QUALITY MANAGEMENT: Air Quality Management – Monitoring of SPM, SO; NO and CO Emission Standards.

TEXT BOOKS:

1. Air Quality by Thodgodish, Levis Publishers, Special India Edition, New Delhi
2. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
3. Air pollution by Wark and Warner.- Harper & Row, New York.

REFERENCE:

1. An introduction to Air pollution by R.K.Trivedy and P.K. Goel, B.S. Publications.
2. Air Pollution and Control by K.V.S.G.Murali Krishna, Kousal& Co. Publications, New Delhi.
3. Enivronmental meteorology by S.Padmanabhammurthy , I.K.Internationals Pvt Ltd,New Delhi.

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Subject Code	Title of the Subject	L	T	P	C
	ENVIRONMENTAL ECONOMICS (OEC-III)	3	0	0	3

Course Objectives:

The objectives of this course are:

1.	To impart knowledge on sustainable development and economics of energy
2.	To teach regarding environmental degradation and economic analysis of degradation
3.	To inculcate the knowledge of economics of pollution and their management
4.	To demonstrate the understanding of cost benefit analysis of environmental resources
5.	To make the students to understand principles of economics of biodiversity

COURSE OUTCOMES:

On completion of the course, the students will be able to:

1	Understand the information on sustainable development and economics of energy
2	Understand the information regarding environmental degradation and economic analysis of degradation
3	Understand the identification of economics of pollution and their management
4	Understand the cost benefit analysis of environmental resources
5	Understand the principles of economics of biodiversity

UNIT– I

Sustainable Development: Introduction to sustainable development - Economy-Environment inter-linkages - Meaning of sustainable development - Limits to growth and the environmental Kuznets curve – The sustainability debate - Issues of energy and the economics of energy – Nonrenewable energy, scarcity, optimal resources, backstop technology, property research, externalities, and the conversion of uncertainty.

UNIT– II

Environmental Degradation: Economic significance and causes of environmental degradation - The concepts of policy failure, externality and market failure - Economic analysis of environmental degradation – Equi –marginal principle.

UNIT– III

Economics of Pollution: Economics of Pollution - Economics of optimal pollution, regulation, monitoring and enforcement - Managing pollution using existing markets: Bargaining solutions – Managing pollution through market intervention: Taxes, subsidies and permits.

UNIT– IV

Cost – Benefit Analysis: Economic value of environmental resources and environmental damage - Concept of Total Economic Value - Alternative approaches to valuation – Cost-benefit analysis and discounting.

UNIT – V

Economics of biodiversity: Economics of biodiversity conservation - Valuing individual species

and diversity of species -Policy responses at national and international levels. Economics of Climate Change – stern Report

Reference Books:

1. D.W. Pearce, A. Markandya and E.B. Barbier ―Blueprint for a Green Economy‖,Earthscan, London.(1989),
2. R.K. Turner, D.W. Pearce and I. Bateman –Environmental Economics: AnElementary Introduction‖, Harvester Wheatsheaft, London. (1994),
3. D.W. Pearce and R.K. Turner –Economics of Natural Resources and theEnvironment‖, Harvester Wheatsheaf, London. (1990),
4. Michael S. Common and Michael Stuart –Environmental and ResourceEconomics: An Introduction‖, 2nd Edition, Harlow: Longman.(1996),
5. Roger Perman, Michael Common, Yue Ma and James McGilvray –NaturalResource and Environmental Economics‖, 3rd Edition, Pearson Education.(2003),
6. N. Hanley, J. Shogren and B. White –An Introduction to EnvironmentalEconomics‖, Oxford University Press.(2001),

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Subject Code	Title of the Subject	L	T	P	C
	DISASTER MANAGEMENT (OEC-III)	3	0	0	3

COURSE OBJECTIVES

The objectives of this course are:

1.	To give knowledge types of disasters and stages in disaster rehabilitation process.
2.	To make awareness on change in climates and their impacts on occurrence of environmental disasters.
3.	To impart knowledge on Consideration of wind and water effects as per codal provisions to withstand disasters.
4.	To familiarize the student with the Causes of earthquake and their effects and remedial methods to be adopted for buildings.
5.	To illustrate the methodology in Planning and design considerations of various structures constructing in disaster prone areas.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1.	Understand about various types of disasters and stages in disaster rehabilitation process.
2.	Impact of change in climates and their impacts on occurrence of environmental disasters.
3.	Adopting suitable codal provisions to study the effect of wind and water effects on various structures constructed at disaster prone areas.
4.	Understand the causes of earthquake and their effects and remedial methods to be adopted for buildings.
5.	Adopt suitable Planning and design considerations of various structures constructing in disaster prone areas.

Unit-I

Brief introduction to different types of natural disaster, Occurrence of disaster in different climatic and geographical regions, hazard (earthquake and cyclone) map of the world and India, Regulations for disaster risk reduction, Post disaster recovery and rehabilitation (socioeconomic consequences)

Unit-II

Climate change and its impact on tropical cyclone, Nature of cyclonic wind, velocities and pressure, Cyclone effects, Storm surge, Floods, Landslides. Behavior of structures in past cyclones and wind storms, case studies. Cyclonic retrofitting, strengthening of structures and adaptive sustainable reconstruction. Life–line structures such as temporary cyclone shelter.

Unit-III

Basic wind engineering, aerodynamics of bluff bodies, vortex shedding and associated unsteadiness along and across wind forces. Lab: Wind tunnel testing, its salient features. Introduction to Computational fluid dynamics. General planning/design considerations under wind storms & cyclones; Wind effects on buildings, towers, glass panels etc, & wind resistant features in design.

Codal Provisions, design wind speed, pressure coefficients; Coastal zoning regulation for construction & reconstruction phase in the coastal areas, innovative construction material & techniques, traditional construction techniques in coastal areas.

Unit-IV

Causes of earthquake, plate tectonics, faults, seismic waves; magnitude, intensity, epicenter, energy release and ground motions. Earthquake effects – On ground, soil rupture, liquefaction, landslides. Performance of ground and building in past earthquakes: Behavior of various types of buildings, structures, and collapse patterns; Behavior of Non-structural elements like services, fixtures, mountings- case studies. Seismic retrofitting- Weakness in existing buildings, aging, concepts in repair, restoration and seismic strengthening.

Unit-V

General Planning and design consideration; Building forms, horizontal and vertical eccentricities, mass and stiffness distribution, soft storey etc.; Seismic effects related to building configuration. Plan and vertical irregularities, redundancy and setbacks. Various Types and Construction details of: Foundations, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, under-ground – overhead tanks, staircases and isolation of structures; innovative construction material and techniques; Local practices: traditional regional responses; Computational investigation techniques.

Text Books / References:

1. Disaster Management by Rajib Shah, Universities Press, India, 2003
2. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
3. Abbott, L. P. (2013). *Natural disasters*. 9th Ed. McGraw-Hill.
4. Agarwal, P. and Shrikhande, M. (2009). *Earthquake Resistant Design of Structures*. New Delhi : PHI Learning.
5. Bankoff, G., Frerks, G. and Hilhorst, D. (2004). *Mapping Vulnerability: Disasters, Development and People*. London : Earthscan.
6. Dutta, S. C. and Mukhopadhyay, P. (2012). *Improving Earthquakes and Cyclone Resistance of Structures:Guidelines for the Indian Subcontinent.* TERI.
7. ICIMOD. (2007). *Disaster Preparedness for Natural Hazards: Current Status in India*. Kathmandu : ICIMOD.
8. Simiu E. and Scanlan R. H. (1996). *Wind Effects on Structures-Fundamentals and Applications toDesign.* 3rd Edn., John Wiley.
9. Sinha, P. C. (2006). *Disaster Mitigation, preparedness, recovery and Response*. New Delhi : SBS Publishers.
10. World Bank. (2009). *Handbook for Reconstructing after Natural Disasters*.

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Subject Code	Title of the Subject	L	T	P	C
	MANAGEMENT SCIENCE	3	0	0	3

COURSE OBJECTIVES: The objectives of this course are	
1	To provide fundamental knowledge on Management, Administration, Organization & its concepts.
2	To make the students understand the role of management in Production
3	To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training &Development, job evaluation and Merit rating concepts
4	To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
5	To make the students aware of the contemporary issues in management

COURSE OUTCOMES: At the end of the course, students will be able to	
CO1	Understand the concepts & principles of management and designs of organization in a practical world.
CO2	Apply the knowledge of Work-study principles & Quality Control techniques in industry.
CO3	Analyze the concepts of HRM in Recruitment, Selection and Training & Development.
CO4	Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT
CO5	Create Modern technology in management science

UNIT-I:**INTRODUCTION TO MANAGEMENT**

Management-Concept and meaning-Nature-Functions-Management as a Science and Art and both. Schools of Management Thought-Taylor‘s Scientific Theory-Henry Fayol‘s principles-Elton Mayo‘s Human relations-Systems Theory- **Organizational Designs**-Line organization-Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of Organization-Social responsibilities of Management.

LEARNING OUTCOMES: At the end if the Unit, the learners will be able to

- Understand the concept of management and organization
- Analyze the organization chart & structure for an enterprise.
- Apply the concepts & principles of management in real life industry.
- Evaluate and interpret the theories and the modern organization theory.

UNIT-II:OPERATIONSMANAGEMENT

Principles and Types of Plant Layout-Methods of Production (Job, batch and Mass Production), Work Study- Statistical Quality Control- Deming ‗s contribution to Quality. **Materials Management** - Objectives- Inventory-Functions - Types, Inventory Techniques-EOQ-ABC Analysis-Purchase Procedure and Stores Management- **Marketing Management** -Concept-Meaning - Nature-Functions of Marketing - Marketing Mix- Channels of Distribution - Advertisement and Sales Promotion- Marketing Strategies based on Product Life Cycle.

LEARNING OUTCOMES: At the end of the Unit, the learners will be able to

Understand the core concepts of Management Science and Operations Management

- Apply the knowledge of Quality Control, Work-study principles in real life industry.
- Analyze Marketing Mix Strategies for an enterprise
- Evaluate Materials departments &Determine EOQ
- Create and design advertising and sales promotion

UNIT-III:HUMAN RESOURCES MANAGEMENT (HRM)

HRM- Evolution of HRM - Definition and Meaning – Nature-Managerial and Operative functions--Job Analysis -Human Resource Planning (HRP)–Process of Recruitment&Selection - Training and Development-Performance Appraisal-Methods of Performance Appraisal – Placement-Employee Induction-Wage and Salary Administration.

LEARNING OUTCOMES: At the end if the Unit, the learners will

- Understand the concepts of HRM in Recruitment, Selection, Training & Development
- Apply Managerial and operative Functions
- Analyze the need of training
- Evaluate performance appraisal
- Design the basic structure of salaries and wages

UNIT-IV:STRATEGIC& PROJECT MANAGEMENT

Strategy Definition& Meaning-Vision - Mission- Goals- Corporate Planning Process-Environmental Scanning-Steps in Strategy Formulation and Implementation-SWOT Analysis

Project Management- Network Analysis- Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project within given time - Project Cost Analysis - Project Crashing (Simple problems).

LEARNING OUTCOMES: At the end of the Unit, the learners will be able to

- Understand Mission, Objectives, Goals & strategies for an enterprise
- Apply SWOT Analysis to strengthen the project
- Analyze Strategy formulation and implementation
- Evaluate PERT and CPM Techniques
- Creative in completing the projects within given time

UNIT -V:Contemporary Issues In Management

The concept of Management Information System (MIS)- Materials Requirement Planning (MRP)-Customer Relations Management (CRM)- Total Quality Management (TQM)- Six Sigma Concept-Supply Chain Management (SCM)- Enterprise Resource Planning (ERP)- Performance Management- Business Process Outsourcing (BPO) - Business Process Re-engineering and Bench Marking -Balanced Score Card-Knowledge Management.

LEARNING OUTCOMES

At the end if the Unit, the learners will be able to

- Understand modern management techniques
- Apply Knowledge in Understanding in modern
- Analyze CRM,MRP,TQM
- Evaluate Six Sigma concept and SCM

Text Books:

1. A.R Aryasri, Management Science, TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education,New Delhi, 2012.

References:

1. Koontz &Weihrich, Essentials of Management, 6/e, TMH, 2005.
2. Thomas N.Duening& John M.Ivancevich, ManagementPrinciples and Guidelines,Biztantra.
3. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
4. Samuel C.Certo, Modern Management, 9/e, PHI, 2005

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Subject Code	Title of the Subject	L	T	P	C
	ORGANIZATIONAL BEHAVIOUR	3	0	0	3

COURSE OBJECTIVES:	
1	To enable student's comprehension of organizational behaviour
2	To offer knowledge to students onself-motivation, leadership and management
3	To facilitate them to become powerful leaders
4	To Impart knowledge about group dynamics
5	To make them understand the importance of change and development

COURSE OUTCOMES: At the end of the course, students will be able to	
1	Define the Organizational Behavior, its nature and scope.
2	Understand the nature and concept of Organizational behavior
3	Apply theories of motivation to analyze the performance problems
4	Analyze the different theories of leadership
5	Evaluate group dynamics
6	Develop as powerful leader

Unit-I: Introduction

, Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective -Understanding Individual Behavior –Attitude -Perception - Learning – Personality.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the concept of OrganizationalBehavior
- Contrast and compare Individual& Group Behavior andattitude
- Evaluate personality types

Unit-II: Motivation and Leading

Theories of Motivation- Maslow'sHierarchy of Needs - Hertzberg's Two Factor Theory - Vroom's theoryof expectancy - McClelland's theory of needs–Mc Gregor's theory X and theory Y– Adam's equity theory – Locke's goal setting theory– Alderfer'sERG theory - Leadership–research,theories, traits - LeadersVs Managers.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the concept of Motivation
- Analyze theTheories of motivation
- Explain how employees are motivated according to Maslow's Needs Hierarchy

Unit-III: Organizational Culture

Introduction – Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of goodLeader - Conflict Management -Evaluating Leader- Women and Corporate leadership.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the concept of Leadership
- Contrast and compare Trait theoryand Managerial Grid
- Distinguish the difference between Transactional and Transformational Leadership

- Evaluate the qualities of good leaders

Unit-IV:Group Dynamics

Introduction – Meaning, scope, definition, Nature- Types of groups - Determinants of groupbehavior - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization– Conflict resolution

LEARNING OUTCOMES: -After completion of this unit student will

- Understand theconcept of Group Dynamics
- Contrast and compare Group behavior and group development
- Evaluate how to resolve conflicts in the organization

Unit-V:Organizational Change and Development

Introduction –Nature, Meaning, scope, definition and functions- Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization‘s change and development

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the importance of organizational change and development
- Apply change management in the organization
- Analyze work stress management
- Evaluate Managerial implications of organization

TEXT BOOKS:

1. Luthans, Fred, OrganisationalBehaviour, McGraw-Hill, 12 Th edition 2011 2. P SubbaRao,OrganisationalBehaviour,HimalyaPublishing House 2017

References

- McShane, Organizational Behaviour, TMH 2009
- Nelson,OrganisationalBehaviour, Thomson, 2009.
- Robbins, P.Stephen, Timothy A. Judge, OrganisationalBehaviour, Pearson 2009.
- Aswathappa,OrganisationalBehaviour,Himalaya, 2009

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Subject Code	Title of the Subject	L	T	P	C
	Business Environment	3	0	0	3

Course Objectives	
1	To make the student understand about the business environment
2	To enable them in knowing the importance of fiscal and monitory policy
3	To facilitate them in understanding the export policy of the country
4	To Impart knowledge about the functioning and role of WTO
5	To Encourage the student in knowing the structure of stock markets

COURSE OUTCOMES: At the end of the course, students will be able to	
1	Define Business Environment and its Importance.
2	Understand various types of business environment.
3	Apply the knowledge of Money markets in future investment
4	Analyze India‘s Trade Policy
5	Evaluate fiscal and monitory policy
6	Develop a personal synthesis and approach for identifying business opportunities

Unit-I:Overview of Business Environment

Introduction – meaning Nature,Scope,significance, functions and advantages. Types- Internal & External, Micro and Macro. Competitive structure of industries -Environmental analysis- advantages & limitations of environmental analysis& Characteristics of business.

Learning Outcomes: -After completion of this unit student will

- Understand the concept of Business environment
- Classify various types of business environment
- Evaluate the environmental analysis in business
- Discuss the Characteristics of Business.

Unit-II:Fiscal Policy

Introduction – Nature, meaning, significance, functions and advantages. Public Revenues - Public Expenditure - Public debt - Development activities financed by publicexpenditure - Evaluation of recent fiscal policy of GOI. Highlights of Budget- Monetary Policy - Demand and Supply of Money –RBI -Objectives of monetary and credit policy - Recent trends- Role of Finance Commission.

Learning Outcomes: -After completion of this unit student will

- Understand the concept of public revenue and public Expenditure
- Identify the functions of RBI and its role
- Analyze the Monitory policy in India
- Know the recent trends and the role of Finance Commission in the development of our country
- Differentiate between Fiscal and Monitory Policy

Unit-III:India’s Trade Policy

Introduction – Nature, meaning, significance, functions and advantages. Magnitude and direction of Indian International Trade - Bilateral and Multilateral TradeAgreements - EXIM policy and role of EXIM bank -Balance of Payments– Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

Learning Outcomes: -After completion of this unit student will

- Understand the role ofIndian international trade
- Understand and explain the need for Export and EXIM Policies
- Analyze causes for Disequilibrium and correction measure
- Differentiate between Bilateral and Multilateral Trade Agreements

UNIT-IV:World Trade Organization

Introduction – Nature, meaning, significance, functions and advantages. Organization and Structure - Role andfunctions of WTO in promoting world trade - Agreements in the Uruguay Round – TRIPS, TRIMS, and GATT - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

Learning Outcomes: -After completion of this unit student will

- Understand the role of WTO in trade
- AnalyzeAgreements on trade by WTO
- Understand the Dispute Settlement Mechanism
- Compare and contrast the Dumping and Anti-dumping Measures.

Unit-V:Money Markets And Capital Markets

Introduction – Nature, meaning, significance, functions and advantages. Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI - StockExchanges - Investor protection and role of SEBI.

Learning Outcomes: -After completion of this unit student will

- Understand the components of Indian financial system
- Know the structure of Money markets and Capital markets
- Analyze the Stock Markets
- Apply the knowledge in future investments
- Understand the role of SEBI in investor protection.

TEXT BOOKS:

1. Francis Cherunilam (2009), International Business: Text and Cases, Prentice Hall of India.
2. K. Aswathappa, Essentials of Business Environment: Texts and Cases & Exercises 13th Revised Edition.HPH2016

REFERENCE BOOKS:

1.K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.

2. Sundaram, Black (2009), International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.

3. Chari. S. N (2009), International Business, Wiley India.

Bhattacharya (2009), International Business, Excel Publications, New Delhi.

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Subject Code	Title of the Subject	L	T	P	C
	COMPUTER AIDED DESIGNING AND DRAFTING LAB	0	0	3	1.5

Course Objectives:

1.	To make the student familiar with civil engineering softwares related to design and drawing

Course Outcomes:

At the end of the course, the student will be able to

Design various civil engineering structural elements.

STAAD PRO or Equivalent EXCERCISIES:

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. Column Analysis & Design

TEXT BOOK:

1.Computer Aided Design Lab Manual by Dr.M.N.Sesha Prakash And Dr.C.S.Suresh

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Subject Code	Title of the Subject	L	T	P	C
	HIGHWAY MATERIALS LAB	0	0	3	1.5

Course Objectives:

1. Test the aggregates for their suitability for use in Road Construction
2. Understand the Test procedures for determination of Crushing Strength , Impact Value, Abrasion Value of Aggregates
3. Understand the Importance of Shape of aggregates and Test Procedures to determine the same
4. Able to Test Bitumen to find out the Penetration Value, Ductility Value, Softening Point and Fire and Flash Point
5. Find out the Optimum Bitumen Content in a Bituminous Concrete by Marshall Stability Test.

Course Outcomes:

1. Ability to conduct Tests on Aggregates for their suitability in Road Construction
2. Ability to conduct Tests on Bitumen to know its grade and suitability in Road Construction
3. Knowledge and Hands on experience on Laboratory Tests on Aggregates and Bitumen
4. Understanding of the Bituminous Concrete Mix Design Procedure
5. Overall knowledge about Highway Materials, Tests on them and Interpretation of Results

Laboratory Experiments:

TESTS ON ROAD AGGREGATES:

- Aggregate Crushing value Test.
- Aggregate Impact Test.
- Abrasion Test.
- Shape tests

TESTS ON BITUMINOUS MATERIALS:

- Penetration Test.
- Ductility Test.
- Softening Point Test.
- Flash and fire point tests.
- Demo on Marshall Stability Test on Bituminous Mixes

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Subject Code	Title of the Subject	L	T	P	C
	URBAN TRANSPORTATION PLANNING(PEC-IV)	3	0	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1.	To impart the knowledge and concepts of Urban Transportation Planning
2.	To make the student to understand the concepts of Travel Demand Modelling
3.	To make the student understand the Surveys required for Urban Transportation Planning
4.	To familiarize the student with the concepts of Trip generation, Trip Distribution
5.	To familiarize the student with the concepts of Mode Split and Traffic assignment

COURSE OUTCOMES:

On completion of the course, the students will be able to:

1.	Making the student to realize the need for Transportation Planning
2.	To familiarize the students with the surveys and data collection needed for Urban Transportation Infrastructure
3.	Impart to the students, the concepts of Trip Generation, Trip distribution, Mode Split and Network assignment
4.	Making the student technically suitable to take up a job as a Transportation Engineer
5.	Making the student with the concepts of Mode Split and Traffic assignment

UNIT-I:

Urban Transportation Planning And Travel Demand: Urban Issues, Travel Characteristics, Evolution Of Planning Process, Supply And Demand – Systems Approach. Overall Planning Process, Long Term Vs Short Term Planning. Travel Demand Function, Independent Variables, Travel Attributes, Assumptions In Travel Demand Estimation, Sequential, And Simultaneous Approaches, Aggregate And Disaggregate Techniques.

UNIT-II:

Data Collection And Inventories: Collection Of Data – Organization Of Surveys And Analysis, Study Area-_Definition And Guidelines, Zoning Principles, Types And Sources Of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use Of Secondary Sources.

UNIT-III:

Trip Generation And Distribution : Definition Of Trip –Trip Characteristics- Types Of Trips-Home Based And Non-Home Based Trips – Factors Affecting Trip Making Behavior -TripGeneration Analysis:

Zonal Models, Category Analysis, Household Models, Trip Attraction Models.

UNIT IV:

Trip Distribution: Growth Factor Methods- Uniform Growth Factor – Average Growth Factor – Fraters Method– Advantages And Disadvantages Of Growth Factors. Gravity Model – Formulation and Calibration.

UNIT-V:

MODE CHOICE AND TRAFFIC ASSIGNMENT:

Mode Choice: Factors Affecting Mode Choice-Mode Choice Behavior - Competing Modes, Mode Split Curves, Models And Probabilistic Approaches-Use Of Diversion Curves.

Traffic Assignment: Basic Elements Of Transport Networks, Coding, Route Properties, Minimum Path, **Assignment Techniques:** All-Or-Nothing Assignment, Capacity Restraint Technique, Multiple Route Assignment. Basic Numerical Examples.

Text Books:

1. Kadiyali.L.R., _Traffic Engineering and Transportation Planning‘, Khanna Publishers, New Delhi.
2. Hutchinson, B.G, _Introduction to Urban System Planning‘, McGraw Hill.
3. Khisty C.J., _Transportation Engineering – An Introduction‘ Prentice Hall.
4. Papacostas,_Fundamentals of Transportation Planning‘, Tata McGraw Hill.

Reference Books:

1. Mayer M and Miller E, _Urban Transportation Planning: A decision oriented Approach‘, McGraw Hill.
2. Bruton M.J., _Introduction to Transportation Planning‘, Hutchinson of London.
3. Dicky, J.W., _Metropolitan Transportation Planning‘, Tata McGraw Hill.

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Subject Code	Title of the Subject	L	T	P	C
	BUILDING CONSTRUCTIONPRACTICE (PEC-IV)	3	0	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1.	To Impart knowledge in investigation of soil condition, Deciding and design of suitable foundation for different structures
2.	To examine the good materials to be used for the construction work
3.	To teach to supervision of different types of masonry
4.	To illustrate the methodology in selection of materials, design and supervision of suitable type of floor and roof.
5.	To teach the methodology of constructing advances structures

COURSE OUTCOMES:

On completion of the course, the students will be able to:

1	Understand the property , use , advantage and disadvantage of diffent material used in construction
2	Understand the Internal Construction and Finishes
3	Understand the Construction of high rise buildings:
4	Understand the Concepts and components of bridges:
5	Understand the Construction of Power Generating Structures

UNIT -I:

Structural Components:

Foundations – classification of Foundations – consideration in selection of foundation types – Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars – Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures – Components – Construction Procedure – Panel walls – National Standards.

UNIT -II:

Internal Construction and Finishes

Internal elements – Internal walls – Construction joints – Internal walls, fire protection –separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of Paints – Types of Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints –Emulsion - Paints – Whitewash and Color wash – Application of Paints –Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards.

UNIT- III:

Construction of high rise buildings:

Construction methods and techniques using different materials, Minerals, Admixtures in-situ concrete, Precast Concrete & Structural Steel, finished concrete, tunnel form, fire Fighting, Safety

& Hazards, and Job Safety Analysis. Innovative methods of construction – Slip form technology, Jump form technology, Aluform& Tunnel Form Technology, Dry wall technology, Plastering Machines.

UNIT -IV:

Concepts and components of bridges:

Bridges, Steel Bridges, Arch Bridges, Cantilever Bridges Segmental construction & Box Girders. Construction of special type of bridges such as cable stayed bridge, suspension and Pre-stressed Bridge, construction of foundation and Super structure. Construction of Metro Railway & Monorail - Underground and over ground structures, different methods and techniques of construction. Problems and solutions – during maintenance and upkeep of structures. Fire, Ventilation, Dewatering and power supply, Subsidence, Vibration etc., Concept of Mag-rail.

UNIT -V:

Construction of Power Generating Structures

Atomic Power stations, Thermal power stations- Generation Power Plants, Windmills, Transmission towers, Chimneys (single and multi-flue), cooling towers - Natural draft cooling towers (NDCT) & Induced draft cooling tower (IDCT), Ash handling system, Containment Structure, Electro Static Precipitator (ESP), Case study of Kaiga atomic power station, Madras atomic power station. Or Any other Case Study and Safety Hazards

TEXT BOOKS:

1. Roy Chudley and Roger Greeno, ‒Construction Technology‖, Prentice Hall, 2005.
2. Peurifoy, ‒Construction Planning, Equipment and methods‖, Tata McGraw Hill Publication

REFERENCES

1. Mahesh Varma, ‒Construction Equipment Planning and Applications‖.
2. Kumar Niraj Jha, - ‒Formwork for Concrete Structures‖, Mc Graw Hill Publication
3. Sushil Kumar ‒Building Materials and construction‖, 20th edition, reprint 2015, Standard Publishers
4. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, ―Building Construction‖, Laxmi Publications (P) Ltd., New Delhi.

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Subject Code	Title of the Subject	L	T	P	C
	ADVANCED FOUNDATION ENGINEERING(PEC-IV)	3	0	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1.	To impart how Meyerhof's general bearing capacity equations are important over Terzaghi's bearing capacity equation.
2.	To teach special methods of computation of settlements and the corrections to be applied to settlements and to understand the advanced concepts of design of pile foundations.
3.	To throw light on pile and well foundations.
4.	To teach the difference between isolated and combined footings
5.	To teach the determination of bearing capacity of mats and proportioning of footings.

COURSE OUTCOMES :

On completion of the course, the students will be able to:

1.	Understand the knowledge on Meyerhof's general bearing capacity equations are important over Terzaghi's bearing capacity equation.
2.	Understand the knowledge on special methods of computation of settlements and the correctionsto be applied to settlements and to understand the advanced concepts of design of pile foundations.
3.	Understand the knowledge on light on pile and well foundations.
4.	Understand the knowledge on the difference between isolated and combined footings
5.	Understand the knowledge on proportioning of footings.

Unit -I

SHALLOW FOUNDATIONS: General requirements of foundations. Types of shallow foundations and the factors governing the selection of type of shallow foundation. Bearing capacity of shallow foundations by Terzaghi's theory and Meyerhof's theory (derivation of expressions and solution to problems based on these theories). Local shear and general shear failure and their identification. Bearing capacity of isolated footing subjected to eccentric and inclined loads.

Bearing capacity of isolated footing resting on stratified soils- Analysis and structural design of R.C.C isolated, combined and strap footings.

Unit-II

Proportioning of isolated, combined, strap footings and mat foundations (Excluding RCC design). Settlement analysis of foundations resting on different soil

Unit –III

DEEPFOUNDATIONS:

Pile foundations-types of pile foundations. Estimation of bearing capacity of pile foundation by dynamic and static formulae. Bearing capacity and settlement analysis of pile groups. Negative skin Friction, Pile load tests.

Caissons and Well foundations – Elements of well foundation. Forces acting a on a well foundation. Depth and bearing capacity of well foundation. Design of individual components of

well foundation (Excluding RCC design). Lateral stability of well foundations. Problems associated with well sinking. Pneumatic caisson.

Unit- IV

SHEET PILE WALLS:

Cantilever sheet piles and anchored bulkheads, Earth Pressure diagram, Determination of depth of embedment in sands and clays-Timbering of Trenches – Earth Pressure Diagrams – Forces in struts. Types of coffer dams

Unit-V

FOUNDATIONS IN EXPANSIVE SOILS: Basic foundation problems associated with black cotton soils. Use of sand cushion and Cohesive Non Swelling (CNS) layer below shallow foundations. Stone column techniques-principles and execution. Under reamed piles-principle of functioning of under reamed pile-Bearing capacity of under reamed pile.

TEXT BOOKS:

1. Theory and Practice of Foundation Design by N. N. Som and S.C. Das, PHI publications
2. Foundation Design by W.C. Teng, Prentice Hall Publishers
3. Geotechnical Engineering by C. Venkatramaiah, New age International Pvt . Ltd, Delhi

Reference Books:

1. Soil mechanics and foundation Engg. By K.R. Arora, Standard Publishers and distributors, Delhi
2. Basic and Applied Soil mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, Delhi
3. Foundation engineering by Brije.M.Das, Cengage pubilications,New Delhi.

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Subject Code	Title of the Subject	L	T	P	C
	REMOTE SENSING & GIS	3	0	0	3

COURSE OBJECTIVES:

The objectives of this course are to:

1	Apply the concepts of Photogrammetric and its applications such as determination of heights of objects on Terrain .
2	Understand the basic concept of Remote Sensing and know about different types of satellite and sensors.
3	Illustrate Energy interactions with atmosphere and with earth surface features, Interpretationof satellite and top sheet maps
4	Understand different components of GIS and Learning about map projection and coordinate system
5	Develop knowledge on conversion of data from analogue to digital and working with GIS softw**a**re.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1.	Comparing with ground, air and satellite based sensor platforms.
2.	Interpret the aerial photographs and satellite imageries.
3.	Create and input spatial data for GIS application.
4.	Apply RS and GIS concepts in water resources engineering.
5.	Applications of various satellite data.

UNIT – I

Introduction to photogrammetric:

Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II

Remote sensing:

Basic concepts and foundation of remote sensing – Elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III

Geographic information system:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS

mapping.

UNIT – IV

GIS spatial analysis:

Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V

Water resources applications:

Land use/Land cover in water resources, Surface water mapping and inventory -Watershed management for sustainable development and Watershed characteristics - Reservoir sedimentation, Fluvial Geomorphology - Ground Water Targeting, Identification of sites for artificial Recharge structures - Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

1. B. Bhatta, –Remote Sensing and GIS‖, Oxford University Press, New Delhi.
2. Satheesh Gopi, Advanced surveying: Total station GIS and remote sensing, Pearson publication.

REFERENCES:

1. George Joseph, –Fundamentals of remote sensing‖, Universities press, Hyderabad.
2. C. P. Lo Albert, K.W. Yonng, –Concepts & Techniques of GIS‖, Prentice Hall (India) Publications.
3. M. Anji Reddy –Remote sensing and GIS‖, B. S. Publications, New Delhi.
4. L. R. A. Narayana, –Remote Sensing and its applications‖, University Press 1999.

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Subject Code	Title of the Subject	L	T	P	C
	GLOBAL WARMNG AND CLIMATIC CHANGES	3	0	0	3

COURSE OBJECTIVES

The objectives of this course are:

1	To know the basics, importance of global warming.
2	To know about the layers of atmosphere and their characteristics
3	To know the impacts of climate changes
4	To know about the causes of climate change and carbon credits, effect of change in temperature and climate on India.
5	To know the concepts of mitigation measures against global warming

COURSEOUTCOME

On completion of the course, the students will be able to:

1	To identity the importance of Ozone and effect of greenhouse gases &To know the effect of global warming
2	To know about the layers of atmosphere and their characteristics
3	To know about the causes of climate change and its effects on various sectors.
4	To know about the causes of climate change and carbon credits, effect of change in temperature and climate on India.
5	To know about the clean technology, use of renewable energy, mitigation technologies and their practices.

UNIT - I

EARTH'SCLIMATESYSTEM:

Introduction to environment, Ozone, ozone layer and its functions, Ozone depletion and ozone hole, Vienna convention and Montreal protocol, Green house gases and green house effect, Hydrological cycle and Carbon cycle,Global warming and its impacts

UNIT - II

ATMOSPHERE&ITSCOMPONENTS: Atmosphereanditslayers-CharacteristicsofAtmosphere - Structure of Atmosphere - Composition of Atmosphere - Atmospheric stability -Temperature profile of the atmosphere- Temperature inversion and effects of inversion on pollution dispersion.

UNIT - III

IMPACTS OF CLIMATE CHANGE : Causes of Climate change - Change of Temperature in the environment - Melting of ice and sea level rise - Impacts of Climate Change on various sectors - Projected impacts for different regions, uncertainties in the projected impacts andrisk of irreversible changes.

UNIT - IV

OBSERVED CHANGES AND ITS CAUSES: Climate change and Carbon credits- Clean Development Mechanism (CDM), CDM in India - Kyoto Protocol - IntergovernmentalPanel on Climate Change (IPCC) - Climate Sensitivity - Montreal Protocol - United NationsFrame work Convention on Climate Change (UNFCCC) - Global change in temperature and climate and changes within India

UNIT - V

CLIMATE CHANGE AND MITIGATION MEASURES: CDM and Carbon Trading - Clean Technology, biodiesel, compost, biodegradable plastics- Renewable energy usage as an alternative - Mitigation Technologies and Practices within India andaround the world - Non-renewable energy supply to all sectors-Carbon sequestration-International and regional cooperation for waste disposal biomedical wastes, hazardous wastes, e-wastes, industrial wastes,etc.

REFERENCE BOOKS

1. DashSushilKumar,‒Climate Change– AnIndianPerspective‖,CambridgeUniversityPressIndiaPrivatelimited2007.
2. Adaptation and mitigation of climate change- Scientific Technical Analysis.Cambridge UniversityPress ,Cambridge,2006.
3. AtmosphericScience,J.M.WallaceandP.V.Hobbs,Elsevier/AcademicPress2006.
4. Jan C. van Dam, Impacts of ‒Climate Change and Climate Variability on hydrological Regimes‖,Cambridge universitypress ,2003.
5. David Archer, GlobalWarming:UnderstandingtheForecast,2nded.(Wiley, 2011 JohnHoughton, Global Warming:The Complete Briefing, 5thEdition, 2015 CambridgeUniv.Press

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-19 Civil Engineering)
Semester-8 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	HEALTH, SAFETY ANDENVIRONMENTAL	3	0	0	3

COURSE OBJECTIVES

The objectives of this course are:

1	To understand safety, health and environmental management.
2.	To be familiar with hazard classification and assessment, hazard evaluation and hazard . control, environmental issues and management
3.	To get exposed to accidents modeling, accident investigation and reporting, concepts of. HAZOP and PHA
4.	To be familiar with safety measures in design and process operations.
5.	To get exposed to risk assessment and management, principles and methods

COURSE OUTCOMES

On completion of the course, the students will be able to

1.	To understand safety, health and environmental management.
2.	To be familiar with hazard classification and assessment, hazard evaluation and hazard.
3.	To get exposed to accidents modelling, accident investigation and reporting control, environmental issues and management
4.	To get concepts of HAZOP and PHA.
5.	To be familiar with safety measures in design and process operations.

Unit – I

Introduction to safety, health and environmental management - Basic terms and their definitions - Importance of safety - Safety assurance and assessment - Safety in design and operation - Organizing for safety.

Unit – II

Hazard classification and assessment - Hazard evaluation and hazard control.
Environmental issues and Management - Atmospheric pollution - Flaring and fugitive release - Water pollution - Environmental monitoring - Environmental management.

Unit – III

Accidents modelling - Release modelling - Fire and explosion modelling - Toxic release and dispersion Modelling

Unit – IV

accident investigation and reporting - concepts of HAZOP and PHA.
Safety measures in design and process operations - Inserting, explosion, fire prevention,sprinkler systems.

Unit – V

Risk assessment and management - Risk picture - Definition and characteristics - Risk acceptance criteria - Quantified risk assessment - Hazard assessment - Fatality risk assessment - rRsk management principles and methods.

Reference Books

1. Skelton. B, Process Safety Analysis, Gulf Publishing Company, Houston, 210pp., 1997.
2. TerjeAven and Jan Erik Vinnem, Risk Management with Applications from Offshore Petroleum Industry, Springer, 200pp., 2007.
3. Jorg Schneider, Introduction to Safety and Reliability of Structures, Structural Engineering Documents Vol. 5, International Association for Bridge and Structural Engineering (IABSE), 138pp., 1997.

4. Roger L. Brauer, Safety and Health for Engineers, John Wiley and Sons Inc. pp. 645-663, 2006.
5. Srinivasan Chandrasekaran, Health, Safety and Environmental Management in Offshore and Petroleum Engineering, John Wiley and Sons, 2016.

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Honors Degree Syllabus

Subject Code	Title of the Subject	L	T	P	C
	SOIL DYNAMICS	2	1	0	3

COURSE OBJECTIVE :

The objectives of this course are:

1	To make the student understand the fundamental definitions of vibrations like simple harmonic motion etc and vibration measurements.
2	To make the student understand about the wave propagation and dynamic soil properties and laboratory testing, field testing techniques.
3	To make the student analyze the vibrations using various methods and also effects footing shapes on vibratory response
4	To make the student analyze and design of foundations for reciprocating engines and impact type machines
5	To make the student analyze and design of piles under various types of vibration conditions such as vertical vibrations etc.

COURSE OUTCOMES :

On completion of the course, the students will be able to

1	Understand the fundamental definitions of vibrations like simple harmonic motion, frequency dependent excitation etc.
2	Understand about the wave propagation and dynamic soil properties and laboratory and field testing techniques.
3	Analyze the vibrations using various methods and also effects footing shapes on vibratory response
4	Design of the foundations for reciprocating engines and impact type machines
5	Design of piles under various types of vibration conditions such as vertical vibrations , piles subjected to torsion etc.

UNIT:I

Fundamentals of Vibration: Definitions, Simple harmonic motion, Response of SDOF systems of Free and Forced vibrations with and without viscous damping, Frequency dependent excitation, Systems under transient loads, Rayleigh‘s method of fundamental frequency, Logarithmic decrement, Determination of viscous damping, Transmissibility, Systems with Two and Multiple degrees of freedom, Vibration measuring instruments.

UNIT:II

Wave Propagation and Dynamic Soil Properties: Propagation of seismic waves in soil deposits - Attenuation of stress waves, Stress-strain behaviour of cyclically loaded soils, Strength of cyclically loaded soils, Dynamic soil properties - Laboratory and field testing techniques, Elastic constants of soils, Correlations for shear modulus and damping ratio in sand, gravels, clays and lightly cemented sand. Liquefaction of soils: An introduction and evaluation using simple methods.

UNIT:III

Vibration Analyses: Types, General Requirements, Permissible amplitude, Allowable soil

pressure, Modes of vibration of a rigid foundation block, Methods of analysis, Lumped Mass models, elastic half space method, elasto-dynamics, effect of footing shape on vibratory response, dynamic response of embedded block foundation, Vibration isolation.

UNIT:IV

Design of Machine Foundations: Analysis and design of block foundations for reciprocating engines, Dynamic analysis and design procedure for a hammer foundation, IS code of practice design procedure for foundations of reciprocating and impact type machines. Vibration isolation and absorption techniques.

UNIT:V

Machine Foundations on Piles: Introduction, Analysis of piles under vertical vibrations, Analysis of piles under translation and rocking, Analysis of piles under torsion, Design procedure for a pile supported machine foundation

REFERENCES:

1. I.Chowdhary and S P Dasgupta - Dynamics of Structures and Foundation, 2009.
2. Arya, S. D, O'Neil, M. and Pincus, G.- Design of Structures and Foundations for Vibrating Machines, Gulf Publishing Co., 1979.
3. Prakash, S. and Puri, V. K. - Foundation for Machines: Analysis and Design, John Wiley & Sons, 1998.
4. Prakash, S. - Soil Dynamics, McGraw Hill, 1981.
5. Kameswara Rao, N. S. V. - Vibration Analysis and Foundation Dynamics, Wheeler Publication Ltd., 1998.
6. Richart, F. E. Hall J. R and Woods R. D. - Vibrations of Soils and Foundations, Prentice Hall Inc., 1970.
7. Swami Saran - Soil Dynamics and Machine Foundation, Galgotia Publishing, 1999.
8. Das, B. M. - Principles of Soil Dynamics, PWS KENT publishing Company, Boston.
9. Kramer S. L. - Geotechnical Earthquake Engineering, Prentice Hall, 1996.

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B.Tech (R-19 Civil Engineering)

Subject Code	Title of the Subject	L	T	P	C
	ADVANCED STRUCTURAL DESIGN	2	1	0	3

Honors Degree Syllabus

COURSE OBJECTIVES:

1	To teach concepts of concrete beams and slabs by following different codes by BS 8110 - Euro code – ACI - IS 456
2	To Understand Estimation Of Crack width In -Beams , Shrinkage And Thermal Cracking By IS 456 Of BS 8110
3	To impart design procedure of Shear In Flat Slabs And Flat Plates
4	To impart design Of Plain Concrete Walls And Shear Walls
5	To demonstrate design of Design Of Reinforced Concrete Members For Fire Resistance by ISO 834 Standard Heating Conditions

COURSE OUTCOMES

On completion of the course, the students will be able to

1	Understand the basic concepts of concrete beams and slabs by different codes
2	To know the concepts of deep beams by British practice-ACI –IS 456
3	Apply design concepts to Shear In Flat Slabs And Flat Plates
4	Apply design concepts to Plain Concrete Walls And Shear Walls
5	Understand the basic concepts of fire resistance

UNIT : I

Deflection Of Reinforced Concrete Beams And Slabs: Introduction -Short-Term Deflection Of Beams And Slabs -Deflection Due To - Imposed Loads - Short- Term Deflection Of Beams Due To Applied Loads- Calculation Of Deflection By IS 456 - Calculation Of Deflection By BS 8110 - Deflection Calculation By Euro code – ACI Simplified Method - Deflection Of Continuous Beams By IS 456 - Deflection Of Cantilevers - Deflection Of Slabs

UNIT: II

Estimation Of Crack Width In Reinforced Concrete Members And Design Of Deep Beams: Introduction - Factors Affecting Crack width In Beams - Mechanism Of Flexural Cracking Calculation Of Crack Widths - Simple Empirical Method - Estimation Of Crack width In -Beams By IS 456 Of BS 8110 - Shrinkage And Thermal Cracking. Deep Beams: Introduction - Minimum Thickness - Steps Of Designing Deep Beams - Design By IS 456 - Design According To British Practice - ACI Procedure For Design Of Deep Beams - Checking For Local Failures - Detailing Of Deep Beams.

UNIT: III

Shear In Flat Slabs And Flat Plates: Introduction - Checking For One-Way (Wide Beam) Shear - Two-Way (Punching) Shear Permissible Punching Shear - Shear Due To Unbalanced Moment (Torsional Moments) Calculation Of J Values - Strengthening Of Column Areas For Moment Transfer By Torsion Which Produces Shear - Shear Reinforcement Design - Effect Of Openings In Flat Slabs - Recent Revisions In ACI 318 -

Shear In Two – Way Slabs With Beams.

UNIT: IV

Design Of Plain Concrete Walls And Shear Walls: Introduction - Braced And Unbraced Walls - Slenderness Of Walls- Eccentricities Of Vertical Loads At Right Angles To Wall - Empirical Design Method For Plane Concrete Walls Carrying Axial Load - Design Of Walls For In-Plane Horizontal Forces - Rules For Detailing Of Steel In Concrete Walls Design Of Shear Walls: Introduction - Classification Of Shear Walls - Classification According To Behavior - Loads In Shear Walls - Design Of Rectangular And Flanged Shear Walls - Derivation Of Formula For Moment Of Resistance Of Rectangular Shear Walls 28

UNIT: V

Design Of Reinforced Concrete Members For Fire Resistance : Introduction - ISO 834 Standard Heating Conditions- Grading Or Classification - Effect Of High Temperature On Steel And Concrete - Effect Of High Temperatures On Different Types Of Structural Members - Fire Resistance By Structural Detailing From Tabulated Data - Analytical Determination Of The Ultimate Bending Moment Capacity Of Reinforced Concrete Beams Under Fire - Other Considerations

Text/Reference Books:

1. P.Purushothaman, Reinforced Concrete Structural Elements: Behaviour, Analysis And Design, Tata Mc graw Hill.
2. C.E. Reynolds And J.C. Steedman, Reinforced Concrete Desigers Hand Bood, A View Point Publication.
3. Limit State Design Of Reinforced Concrete Structures By P.Dayaratnam, Oxford &Ibh Publishers. 4. Advanced Rcc By N.Krishna Raju, Cbs Publishers & Distributors. 5. Reinforced Cement Concrete Structures – Devdas Menon &Unnikrishna Pillai,

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B.Tech (R-19 Civil Engineering

Subject Code	Title of the Subject	L	T	P	C
	Construction Economics and Finance	2	1	0	3

Honors Degree Syllabus

COURSE OBJECTIVES

The objectives of this course are:

1.	the market structures and integration concepts
2.	To study the role & methods of economics & finance concepts applied to construction business.
3.	Acquire knowledge of economics to facilitate the process of economic decision making
4.	Acquire knowledge on basic financial management aspects
5.	Develop the skills to analyze financial statements

COURSE OUTCOMES

On completion of the course, the students will be able to

1.	Evaluate the economic theories, cost concepts and pricing policies
2.	Apply Systematic evaluation of cost and benefit associated with different projects.
3.	Apply the concepts of financial management for project appraisal
4.	Understand accounting systems and analyze financial statements
5.	Understand the impact of economic investment and project-management Techniques

UNIT - I

Economics- Role of Civil Engineering in Industrial Development-Advances in Civil Engineering and engineering economics- Support matters of Economy as related top Engineering-Market demand and supply-Choice of technology- Quality control and Quality Production-Audit in economic law of returns governing production

UNIT - II

Construction of economics- Construction development in housing, Transport and other infrastructures-Economics of Ecology, environment, energy resources-Local material selection - Form and Functional designs-Construction workers- Urban problems - Poverty-Migration-Unemployment-pollution.

UNIT - III

Basics of accounting -cash basis of accounting- accrual basis of accounting. Final accounts-trading, profit and loss account-balance sheet. Analysis of financial statement - ratio analysis-Dupont chart - trend analysis-common size statement- cash flow analysis. Completed contract method -percentage completion method.

UNIT - IV

Long term sources of financing-Equity -debenture- long term loan - preference share -- venture capital - leasing. Short term sources of fund -- money market instruments - certificate of deposit - cash credit - repurchase agreement - treasury bill - commercial paper .

UNIT – V

Important decision of finance - investment decision -capital budget technique - procurement decision - dividend policy decision. Cost of capital.

TEXT BOOKS:

1. Prasanna Chandra, –Projects - Planning Analysis Selection Implementation & Review ", Tata
McGrawHill Publishing Co., Ltd, New Delhi.
2. Kwaku A., Tenah and Jose M

. Guevera, –Fundamental of Construction Management and
Organization ", Prentice Hall of India
References:
1. Halpin, D.W., " Financial and cost concepts for construction Management ", John Wiley &
Sons, New York,
2. Madura J. and Veit, E.T., –Introduction to Financial Management ", WestPublishing Co.
3. Stephen L. Gruneberg Construction Economics: An Introduction (Building & Surveying Series), Palgrave Macmillan.

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Subject Code	Title of the Subject	L	T	P	C
	Traffic Analysis	2	1	0	3

Honors Degree Syllabus

COURSE OBJECTIVES:
The objectives of this course are:

1.	To make the student understand the application of Statistical Distributions for Traffic Analysis
2.	To introduce the concepts of Queuing Theory and the application of the same for delay analysis
3.	To make the student understand the concept of shock waves in Traffic and the application of the Shock wave Theory to compute delays and speed reduction
4.	To introduce to the students the concept and basic principles of Simulation Modelling and how Simulation Modelling can be used in Traffic Analysis
5.	To give basics of Simulation Modelling and how it can be applied to simulate any Traffic system for analysis of various parameters through case studies

COURSE OUTCOMES:
On completion of the course, the students will be able to

1.	Student will understand the different types of Statistical Distributions available and how they can be effectively used in Traffic Analysis
2.	Student will understand the basic concepts of Queueing Theory and how M/M/1 system can be applied for Toll Plazas and Parking Garages to analyse the Delays, queue characteristics and efficiency of the system
3.	Student will understand the basic concepts of Queueing Theory application for D/D/1 system that can be applied for Traffic Signals andBottlenecks to analyse the Delays and queue characteristics
4.	Student will comprehend the Shock Wave Theory and how it can be applied to delays caused due to unforeseen roadblocks and Bottlenecks
5.	Student will understand basics of Simulation Modelling and how it can be applied to simulate any Traffic system for analysis of various parameters through case studies

UNIT-I:
Traffic Flow Description: Types of Statistical Distributions; Discrete and Continuous Distributions; Counting And Interval Distributions Used In Traffic Analysis; Poisson's Distribution For Vehicle Arrivals; Headway Distributions – Exponential Distribution; Shifted Exponential Distribution; Erlang Distribution; Composite Distribution. Numerical Exercises.

UNIT-II:
Queueing Theory:M/M/1 System:
Introduction To Queuing Theory; Notation Used for Describing A Queue System; Analysis of M/M/1 System; Assumptions And Derivation Of System State Equations; Application Of M/M/1 Analysis For Parking Garages And Toll Plazas- Numerical Examples.

UNIT-III:
Queueing Theory: D/D/1 System:
D/D/1 System: Analysis Of D/D/1 System for Delay Characteristics; Traffic Signal Analysis

As D/D/1 System; Computation of Delays and Queue Dissipation Time – Numerical Examples.

UNIT-IV:

Shockwave Theory:

Concept of Shockwave; Traffic Interruptions Like Accidents or Bottlenecks; Flow-Density Diagram Use in Shockwave Analysis; Use Of Time-Space Diagram For Shockwave Description; Bottleneck Situations And Shockwaves.

UNIT-V:

Traffic Simulation:

Introduction To Simulation; Need for Simulation Modelling; Steps In Simulation; Interval Oriented And Event Oriented Simulation; Use Of Random Numbers In Simulation; Random Number Generation Methods; Computing Headways And Arrival Times Based On Random Numbers; Basic Concepts of Simulation Modelling Application For Signalised Intersections, Pedestrian Crossings And Transit Scheduling.

TEXT BOOKS:

1. Fundamentals Of Transportation Engineering – C.S.Papacostas, Prentice Hall India Publication
2. Principles Of Highway Engineering And Traffic Analysis – F.L.Mannering&W.P.Kilareski, John Wiley Publishers.
3. Traffic Engineering and Transportation Planning -L.R.Kadiyali, Khanna Publications.

REFERENCES:

1. Traffic Flow Theory: A Monograph, TRB Special Report 165
2. Fundamentals Of Transportation Engineering – C.S.Papacostas, Prentice Hall India Publication
3. Principles Of Highway Engineering And Traffic Analysis – F.L.Mannering& W.P.Kilareski, John Wiley Publishers.
4. Traffic Flow Fundamentals – A.D.May, , Prentice Hall India Publication

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B.Tech (R-19 Civil Engineering)

Honors Degree Syllabus

Subject Code	Title of the Subject	L	T	P	C
	SUSTAINABLE RIVER BASIN MANAGEMENT	2	1	0	3

COURSE OBJECTIVES:

The objectives of this course are:

1	To make the student understand the Concepts of sustainability
2	To introduce the concepts of River Basin management
3	To make the student understand the concept of rainfall Economic and financial
4	To educate and technology transfer Water conservation and efficiency Improving monitoring and data management
5	To Evaluate sustainability in river basin management, Sustainability criteria

COURSE OUTCOMES

On completion of the course, the students will be able to

1	student understand the Concepts of sustainability
2	student understand the concepts of River Basin management
3	student understand the concept of rainfall Economic and financial
4	student understand transfer Water conservation and efficiency Improving monitoring and data management
5	student understand sustainability in river basin management, Sustainability criteria

UNIT: I

Concepts of sustainability: Sustainability indicators, resources depletion, growth models Planetary System Boundaries, footprints, prosperity Globalization, inter-connected world Stakeholders in sustainability

UNIT: II

Natural water resources Anthropogenic Climate change, climate variability Hydrological cycle, water balance, catchment terminology, River basin management Water availability, surplus, deficit Water scarcity, water crisis Stream morphology and land use Engineering Pre-requisites: Working knowledge of: the water cycle, water budget, hydrological parameters and instrumentation.

UNIT: III

Status and challenges regarding sustainability and river basin management Water and society, poverty, demography Water governance, integrity, accountability Pollution, water related diseases, source water protection Water and land use, wetlands, desertification Dams, diversions, artificial rainfall Economic and financial instruments in water management Hydrological change due to climate change

UNIT: IV

Towards sustainability in river basin management - a holistic and interdisciplinary approach Protecting water resources / improving water quality Living standards, equity, education and technology transfer Water conservation and efficiency Improving monitoring and data management, decision support systems Improving management and justice Improving

administrative (transnational) structures Improving prediction and risk assessment

UNIT: V

Evaluate sustainability in river basin management, Sustainability criteria (ecological, economic institutional, social) Multi-criteria decision support

TEXT BOOKS :

1. Anthony, J.A., Abdulrahman, S.A., et al. 2003. Integrated water resources management is more a political than a technical challenge. In *Developments in water science*. ed., 9-23. Elsevier, Amsterdam, The Netherlands.Google Scholar

2. Aspinall, R. and Pearson, D. 2000. Integrated geographical assessment of environmental condition in water catchments: Linking landscape ecology, environmental modelling and GIS. *Journal of Environmental Management* 59(4): 299-319.

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COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-20 Civil Engineering)
COURSE STRUCTURE
(for Academic Year 2020-21)

Induction Program – 3 weeks

Semester-1(Theory-4,Lab -5)					
S.No	**CourseNo**	**CourseName**	**Category**	**L-T-P**	**Credits**
1.	20A15101	Linear Algebra and Calculus Common to All branches of Engineering	BS	3-0-0	3
2.	20A15301	Engineering Chemistry Common to CE, MECH, CHEM	BS	3-0-0	3
3.	20A10506	C-Programming & Data Structures Common to CE, MECH, CHEM	ES	3-0-0	3
4.	20A10102	Building Materials and Construction	ES	3-0-0	3
5	20A10303	EngineeringWorkshop Common to CE, MECH, CHEM	LC	0-0-3	1.5
6	20A10508	IT Workshop Common to CE, MECH, CHEM	LC	0-0-3	1.5
7.	20A10104	Civil Engineering workshop	BS	0-0-3	1.5
8.	20A15302	Engineering Chemistry Lab Common to CE, MECH, CHEM	ES	0-0-3	1.5
9.	20A10507	C-Programming & Data Structures Lab Common to CE, MECH, CHEM	ES	0-0-3	1.5
				Total	**19.5**

Semester–2(Theory–5,Lab –4, MC-1)					
S.No	**CourseNo**	**CourseName**	**Category**	**L-T-P**	**Credits**
1.	20A15102	Differential Equations and Vector Calculus Common to all branches of Engineering except CSE	BS	3-0-0	3
2.	20A15203	EngineeringPhysics Common to CE, MECH, CHEM	BS	3-0-0	3
3.	20A15501	Communicative English Common to CE, MECH.	HS	3-0-0	3
4.	20A10101	Strength of Materials-I	ES	3-0-0	3
5.	20A10301	Engineering Drawing Common to CE, MECH, CHEM	LC	1-0-2	2
6.	20A10302	Engineering Graphics Lab Common to CE, MECH, CHEM	LC	0-0-2	1
7.	20A15502	CommunicativeEnglish Lab Common to CE, MECH.	HS	0-0-3	1.5
8.	20A15204	EngineeringPhysics Lab Common to CE, MECH, CHEM	BS	0-0-3	1.5
9.	20A10103	Strength of Materials Lab	ES	0-0-3	1.5
10	20A19101	Universal Human Values Common to CE, MECH, CHEM	MC	3-0-0	0
				Total	**19.5**

***FOR 2020 Admitted Batch only**

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COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU

II – I B.Tech (R20) - COURSE STRUCTURE

CIVIL Engineering

Semester-III					
S.No	**CourseNo**	**CourseName**	**Category**	**L-T-P**	**Credits**
1.	20A35101	Numerical Methods and Probability Theory Common to CE, CHEM	BS	3-0-0	3
2.	20A30101	Strength of Materials - II	PC/ES	3-0-0	3
3.	20A30102	Fluid Mechanics	PC/ES	3-0-0	3
4.	20A30103	Surveying	PC/ES	3-0-0	3
5	20A30104	Concrete Technology	PC/ES	3-0-0	3
6	20A35104	Exploratory Data Analysis Lab	PC/ES	0-0-3	1.5
7.	20A30105	Surveying Lab	PC/ES	0-0-3	1.5
8.	20A30106	Concrete Technology Lab	PC/ES	0-0-3	1.5
9.	20A30107	Skill oriented Course – I Building Planning and Drawing	SC	1-0-2	2
10	20A10803	Mandatory non-credit Course-II Environmental Science Common to CE, MECH, CHEM	MC	3-0-0	0
				Total	**21.5**

Semester–IV					
S.No	**CourseNo**	**CourseName**	**Category**	**L-T-P**	**Credits**
1.	20A40101	Geological Sciences for Civil Engineers	BS	3-0-0	3
2.	20A40102	Structural Analysis	PC/ES	3-0-0	3
3.	20A40103	Hydraulics and Hydraulic Machinery	PC/ES	3-0-0	3
4.	20A40104	Environmental Engineering	PC/ES	3-0-0	3
5.	 20A49101a 20A49101b 20A49101c	Humanities Elective – I Common to All Branches Managerial Economics and Financial Analysis Entrepreneurship and incubation Business Ethics and Corporate Governance	HS	3-0-0	3
6.	20A40105	Fluid Mechanics and Hydraulic Machinery Lab	PC/ES	0-0-3	1.5
7.	20A40106	Environmental Engineering Lab	PC/ES	0-0-3	1.5
8.	20A40107	Geological Sciences Lab	PC/ES	0-0-3	1.5
9.	 20A40108	Skill oriented Course – II Python Programming	SC	1-0-2	2
10	20A49102	Mandatory non-credit Course-III Design Thinking for Innovation Common to All Branches	MC	2-1-0	0
11	20A49901	NSS/NCC/NSO Activities	-	0-0-2	0
				Total	**21.5**
Community Service Internship/Project (Mandatory) for 6 weeks duration during Summer					

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Semester–V						
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	20A50101	Design of Reinforced Concrete Stuctures	3	0	0	3
2.	20A50102	Water Resource Engineering	3	0	0	3
3.	20A50103	Geotechnical Engineering-I	3	0	0	3
4.	20A50104a 20A50104b 20A50104c	Professional Elective-I 1. Advanced Structural Analysis 2. Sub Surface Investigation and Instrumentation 3. Remote Sensing and GIS	3	0	0	3
5.	20A50105	**Open Elective Course – I** (Each department offer one course including Mathematics, Physics, Chemistry andHSS) Experimental Stress Analysis Common to All Branches	3	0	0	3
6.	20A50108	Computer Aided Drafting lab – I	0	0	3	1.5
7.	20A50109	Geotechnical Engineering Lab - I	0	0	3	1.5
8.	20A50110	**Skill oriented course - III** Estimation, Costing and Valuation	1	0	2	2
9.	20A50111	Evaluation of Community Service Project				1.5
10.	20A55401	**Mandatory Non-credit Course** Indian Constitution (CIV, ME, CHEM)	2	0	0	0
Total						**21.5**

Note:

1. A student is permitted to register for Honours or a Minor in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to their Minor from V Semester onwards.
2. A student shall not be permitted to take courses as Open Electives/Minor/Honours with content substantially equivalent to the courses pursued in the student's primary major.
3. A student is permitted to select a Minor program only if the institution is already offering a Major degree program in that discipline

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Semester–VI						
S.No.	**CourseCode**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	20A60101	Design of Steel Structures	3	0	0	3
2.	20A60102	Highway Engineering	3	0	0	3
3.	20A60103	Geotechnical Engineering -II	3	0	0	3
4.	20A60104a 20A60104b 20A60104c	**Professional Elective Course– II** 1. Prestressed Concrete 2. Green Buildings 3. Industrial Waste and Waste- Water Management	3	0	0	3
5.	20A60105	**Open Elective Course – II** (Each department offer one course including Mathematics, Physics, Chemistry andHSS) **1.** Disaster Management Common to All Branches	3	0	0	3
6.	20A60106	Highway Materials Lab	0	0	3	1.5
7.	20A60107	Geotechnical Engineering Lab - II	0	0	3	1.5
8.	20A60108	Computer Aided Drafting lab – II	0	0	3	1.5
9.	20A65502	**Skill oriented course - IV** Soft Skills (CIV, ME, Chemical)	1	0	2	2
10.	20A69901	**Mandatory Non-credit Course** Intellectual Property Rights & Patents (CIV, ME, CHEM)	2	0	0	0
Total						**21.5**
Industry Internship (Mandatory) for 6 - 8 weeks duration during summer vacation						

Honors / Minor course (the hours distribution can be 3-0-2 or 3-1-0 also) 4 0 0 4

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), ANANTAPUR

CIVIL Engineering

Semester-VII						
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	20A70101a 20A70101b 20A70101c	**Professional Elective Course– III** 1. Railways, Airports, Docks and Harbour Engineering 2. Ground Improvement Techniques 3. Repair and Rehabilitation of Structures	3	0	0	3
2.	20A70102a 20A70102b 20A70102c	**Professional Elective Course– IV** 1. Finite Element Methods 2. Advanced Structural Engineering 3. Hydraulic Structures and Water Power Engineering	3	0	0	3
3.		**Professional Elective Course– V (MOOC)** Any MOOC Course which is not studied during the course and available in Swayam, NPTEL	3	0	0	3
4.	20A75401a 20A75401b 20A75401c	**Humanities Elective** **(Common to All Branches)** 1.Management Science 2. Business Environment 3.Organizational Behaviour	3	0	0	3
5.	20A70103	**Open Elective Course – III** (Each department offer one course including Mathematics, Physics, Chemistry andHSS) 1. Building Technology for Engineers **(Common to All Branches)**	3	0	0	3
6.	20A70104	**Open Elective Course – IV** (Each department offer one course including Mathematics, Physics, Chemistry andHSS) 1. Environmental Impact and Assessment **(Common to All Branches)**	3	0	0	3
7.	20A70105	**Skill oriented course – V** Skills on STAAD PRO	1	0	2	2
8.	20A70106	Evaluation of Industry Internship				3
Total						**23**

Semester-VIII							
S.No.	**Course Code**	**Course Name**	**Category**	**L**	**T**	**P**	**Credits**
1.	20A80101	Full Internship & Project work	PR				12
						Total	**12**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), ANANTAPUR

HONOURS DEGREE IN <Civil Engineering>

Honors Degree in Structural Engineering

S.No.	Course Code	Course Name	Contact Hours per week		Credits
			L	T	
1	20A01H11	Cost Effective Housing Techniques	3	1	4
2	20A01H12	Pre- Engineered Buildings	3	1	4
3	20A01H13	Design of Bridges	3	1	4
4	20A01H14	Construction Economics & Finance	3	1	4
SUGGESTED MOOCs**					
5	20A01H15a	Advanced Concrete Technology https://onlinecourses.nptel.ac.in/noc22_ce58/preview	--	--	2
6	20A01H16a	Optimization methods for Civil engineering https://onlinecourses.nptel.ac.in/noc22_ce83/preview	--	--	2

**** Based on the availability of courses offered by NPTEL SWAYAM with a minimum of 12 weeks duration.**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), ANANTAPUR

MINORS Degree in Structural Engineering

0
<Construction Technology >

S.No.	Course Code	Course Title	Contact Hours per week			Credits
			L	T	P	
1.	20A01M11	Building Materials & Construction	3	1	0	4
2.	20A01M12	Building Planning and Drawing	3	1	0	4
3.	20A01M13	Estimation , Costing and Valuation	3	1	0	4
4.	20A01M14	Surveying	3	1	0	4
5.	20A01M15a**	Concrete Technology NPTEL				2
6.	20A01M16a**	Green Buildings https://nptel.ac.in/courses/105102195				2

**** Based on the availability of courses offered by NPTEL SWAYAM with a minimum of 12 weeks duration.**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), ANANTAPUR

Civil Engineering

		Open Elective Course – I*				
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	20A50105	Experimental Stress Analysis	3	0	0	3
2.	20A50205	Electric Vehicle Engineering	3	0	0	3
3.	20A50305	Optimization Techniques	3	0	0	3
4.	20A50405	Basics of Electronics and Communication	3	0	0	3
5.	20A50505	Introduction to Java Programming	3	0	0	3
6.	20A50805	Energy Conversion and Storage Devices	3	0	0	3
7.	20A55101	Optimization Methods (Mathematics)	3	0	0	3
8.	20A55201	Material Characterization	3	0	0	3
9.	20A55401	E-Business (H & SS)	3	0	0	3
10	20A55301	Chemistry Of Energy Materials (Chemistry)	3	0	0	3

***It is mandatory that the candidate should select any subject other than parent branch subject.**

		Open Elective Course – II				
S.No.	**Course**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	20A60105	Disaster Management(CIVIL)	3	0	0	3
2.	20A60205	Renewable Energy Systems(EEE)	3	0	0	3
3.	20A60305	Solar Energy Systems(MECH)	3	0	0	3
4.	20A60405	Basics of Integrated Circuits	3	0	0	3
5.	20A60505	Introduction to Linux Programming (CSE)	3	0	0	3
6.	20A60805	Green Technology(CHEM)	3	0	0	3
7.	20A65101	Mathematical Modelling & Simulation (Common for CIVIL,MECH &CHEM)(Mathemtics)	3	0	0	3
8.	20A65102	Wavelet transforms and its Applications (Common for EEE&ECE) (Mathemtics)	3	0	0	3
9.	20A65103	Statistical Methods for Data Science CSE (Data Science) (Mathemtics)	3	0	0	3
10	20A65201	Physics Of Electronic Materials And Devices (Physics)	3	0	0	3
11	20A65501	Academic Writing and Public Speaking(H & SS)	3	0	0	3
12	20A65301	Chemistry Of Polymers And Its Applications (Chemistry)	3	0	0	3

***It is mandatory that the candidate should select any subject other than parent branch subject.**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), ANANTAPUR

Civil Engineering

		Open Elective Course – III*				
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	20A70103	Building Technology for Engineers (CIVIL)	3	0	0	3
2.	20A70204	Battery Management Systems (EEE)	3	0	0	3
3.	20A70304	Modern Manufacturing Methods (MECH)	3	0	0	3
4.	20A70404	Digital Electronics (ECE)	3	0	0	3
5.	20A70504	CyberSecurity (CSE)	3	0	0	3
6.	20A70804	Industrial Pollution Control Engineering (CHEM)	3	0	0	3
7.	20A75101	Numerical Methods for Engineers	3	0	0	3
8.	20A75201	SMART MATERIALS AND DEVICES (Physics)	**3**	**0**	**0**	**3**
9.	20A75501	Employability Skills (H&SS)	**3**	**0**	**0**	**3**
10	20A75301	GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT (Chemistry)	**3**	**0**	**0**	**3**

***It is mandatory that the candidate should select any subject other than parent branch subject.**

		Open Elective Course – IV*				
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	20A70104	Environmental Impact and Assessment (CIVIL)	3	0	0	3
2.	20A70205	IOT Applications in Electrical Engineering	3	0	0	3
3.	20A70305	Material Handling Equipment (MECH)	3	0	0	3
4.	20A70405	Principles of Digital Signal Processing (ECE)	3	0	0	3
5.	20A70505	Introduction to DBMS (CSE)	3	0	0	3
6.	20A70805	Solid Waste management (CHEM)	3	0	0	3
7.	20A75102	Number theory and its Applications (Mathematics)	3	0	0	3
8.	20A75202	Sensors and Actuators For Engineering Applications (Physics)	**3**	**0**	**0**	**3**
9.	20A79102	English Literary Spectrum (H & Ss)	**3**	**0**	**0**	**3**
10	20A75302	Chemistry Of Nanomaterials And Applications (Chemistry)	**3**	**0**	**0**	**3**

***It is mandatory that the candidate should select any subject other than parent branch subject.**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-20 Civil Engineering)
(Common to all branches of Engineering)

Course Code		L	T	P	C
20A15101	**Linear Algebra and Calculus**	**3**	**0**	**0**	**3**

Pre-requisite **Semester -I**

Course Objectives:

The objectives of this course are:

1.	This course will illuminate the students in the concepts of calculus and linear algebra.
2.	To equip the students with standard concepts and tools to develop the confidence and ability to handle various real world problems and their applications.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	develop the use of matrix algebra techniques that is needed by engineers for practical applications
2	Utilize mean value theorems to real life problems
3	familiarize with functions of several variables which is useful in optimization
4	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems
5	Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

UNIT – I : Matrices

Rank of a matrix by echelon form, solving homogeneous and non-homogeneous system of linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

UNIT – II :

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof);

UNIT – III :
Multivariable calculus :Partial derivatives, total derivatives, chain rule, Euler's theorem, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT – IV :
Multiple Integrals :Double integrals, changing to polar coordinates, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves. Evaluation of triple integrals in Cartesian, cylindrical and spherical polar co-ordinates
UNIT – V :
Special Functions :Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Textbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.
4. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
5. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
6. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
7. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
8. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
9. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
10. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

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COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-20 Civil Engineering)

(Common to CE, MECH, CHEM)

Course Code		L	T	P	C
20A15301	**Engineering Chemistry**	3	0	0	3

Pre-requisite **Semester -I**

Course Objectives:

The objectives of this course are:

1.	To familiarize engineering chemistry and its applications
2.	To impart the concept of soft and hard waters, softening methods of hard water
3.	To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	**List** the differences between temporary and permanent hardness of water, **Explain** the principles of reverse osmosis and electro dialysis. **Compare** quality of drinking water with BIS and WHO standards. **Illustrate** problems associated with hard water - scale and sludge**. Explain** the working principles of different Industrial water treatment processes
2	**Apply** Nernst equation for calculating electrode and cell potentials, **Apply** Pilling Bedworth rule for corrosion and corrosion prevention, **Demonstrate** the corrosion prevention methods and factors affecting corrosion, **Compare** different batteries and their applications
3	**Explain** different types of polymers and their applications, **Solve** the numerical problems based on Calorific valueselectsuitable fuels for IC engines, **Explain** calorific values, octane number, refining of petroleum and cracking of oils
4	**Explain** the constituents of Composites and its classification, **Identify** the factors affecting the refractory material, **Illustrate** the functions and properties of lubricants, demonstrate the phases and reactivity of concrete formation, **Identify** the constituents of Portland cement, **Enumerate** the reactions at setting and hardening of the cement
5	**Summarize**the concepts of colloids, micelle and nanomaterials, **Explain** the synthesis of colloids with examples, **Outline** the preparation of nanomaterials and metal oxides **Identify** the application of colloids and nanomaterials in medicine, sensors and catalysis

UNIT – I:

Water Technology : Introduction –Soft Water and hardness of water, Estimation of hardness of water by EDTA Method - Boiler troubles **–**Priming, foaming**,** scale and sludge, Caustic embrittlement, Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

UNIT - II

Electrochemistry and Applications : Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (Ni-Cad),and lithium ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

Corrosion: Introduction to corrosion, chemical and electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

UNIT - III

Polymers and Fuel Chemistry : Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth and coordination polymerization.

Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of poly styrene. PVC and Bakelite

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol

Fuels **–** Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal, **Liquid Fuels** refining of petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values, cracking of oils; alternative fuels- propane, methanol, ethanoland bio-fuels.

UNIT – IV

Advanced Engineering Materials : Composites- Definition, Constituents, Classification-Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractories- Classification, Properties, Factors affecting the refractory materials and Applications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials- Portland Cement, constituents, phases and reactivity of clinker, Setting and Hardening of cement.

UNIT - V

Surface Chemistry and Applications : SIntroduction to surface chemistry, colloids, micelle formation, synthesis of colloids (any two methods with examples), chemical and electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, solid-gas interface, solid-liquid interface, adsorption isotherm, BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors.

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
4. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANATAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
Common to (CE, ME, CHEM)

Course Code		L	T	P	C
20A10506	C-Programming & Data Structures	3	0	0	3

Pre-requisite **Semester -I**

Course Objectives:

The objectives of this course are:

1.	To illustrate the basic concepts of C programming language.
2.	To discuss the concepts of Functions, Arrays, Pointers and Structures.
3.	To familiarize with Stack, Queue and Linked lists data structures.
4.	To explain the concepts of non-linear data structures like graphs and trees.
5.	To learn different types of searching and sorting techniques.

UNIT – I

Introduction to C Language - C language elements, variable declarations and data types, operators and expressions, decision statements - If and switch statements, loop control statements - while, for, do-while statements, arrays.

UNIT - II

Functions, types of functions, Recursion and argument passing, pointers, storage allocation, pointers to functions, expressions involving pointers, Storage classes – auto, register, static, extern, Structures, Unions, Strings, string handling functions, and Command line arguments.

UNIT - III

Data Structures, Overview of data structures, stacks and queues, representation of a stack, stack related terms, operations on a stack, implementation of a stack, evaluation of arithmetic expressions, infix, prefix, and postfix notations, evaluation of postfix expression, conversion of expression from infix to postfix, recursion, queues - various positions of queue, representation of queue, insertion, deletion, searching operations.

UNIT - IV

Linked Lists– Singly linked list, dynamically linked stacks and queues, polynomials using singly linked lists, using circularly linked lists, insertion, deletion and searching operations, doubly linked lists and its operations, circular linked lists and its operations.

UNIT - V

Trees- Tree terminology, representation, Binary trees, representation, binary tree traversals. binary tree operations, **Graphs**- graph terminology, graph representation, elementary graph operations, Breadth First Search (BFS) and Depth First Search (DFS), connected components, spanning trees. **Searchingand Sorting**– sequential search, binary search, exchange (bubble) sort, selection sort, insertion sort

Textbooks:

1. The C Programming Language, Brian W Kernighan and Dennis M Ritchie, Second Edition, Prentice Hall Publication.
2. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press.
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education.
4. B.A.Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
5. Richard F. Gilberg&Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Reference Books:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, TataMcGraw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-20 Civil Engineering)

Course Code		L	T	P	C
20A10102	BUILDING MATERIALS AND CONSTRUCTION	3	0	0	3

Pre-requisite **Semester -I**

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Identify and characterize the properties of various building materials.
2	Understand the modern building materials, properties and their uses
3	Understand the importance of insulating materials in building construction.
4	Understand the importance of building structural components and its services.
5	Understand the principles and methods of construction in building components

UNIT – I

INTRODUCTION TO BUILDING MATERIALS

Traditional& Organic Building Materials –Stone–Dressingof Stones– Modern Building Materials – Bricks – Manufacturing process – Ceramic Products – Manufacturing Process –Building Materials for Low Cost Housing – Utilisation of Wastes for Alternative Building Materials – Sustainable Materials in Construction, Concepts of energy efficient building envelopes as per ECBC – National Standards.

UNIT - II

GLASS: Introduction to Fenestration- Functions of Glass in Buildings – Constituents and Classification of Glass – Manufacturing Process –Properties of Glass – Common Types of Glass – Special Glass – Advantages and Disadvantages of Glass – National Standards such as ECBC.

PLASTIC: Introduction – Polymerisation – Classification of Plastics– Commonly Used Plastics – Moulding and Fabricating for Plastic Products – Applications – Advantages – Disadvantages – Intelligent Use of Plastics in Buildings – National Standards such as ECBC.

UNIT – III :

INSULATING MATERIALS : Thermal Insulating Materials: Introduction – Thermal Insulation – Heat Transfer Fundamentals – Thermal Properties of Insulating Materials – Selection of Insulating Materials – Classification of Insulation materials – Reflective Insulation Systems – Commonly Used Building Insulation Materials – Insulation that Should not be Used – National Standards such as ECBC.

Sound Insulating Materials: Introduction – Basics of Acoustics – Sound Absorption or Insulation – Green Insulation – Cool Roof, Green Roof, Power Roof – National Standards such as ECBC

UNIT - IV

STRUCTURAL COMPONENTS:–

Foundations – classification of Foundations – consideration in selection of foundation types–

Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars – Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures – Components – Construction Procedure – Panel walls – National Standards such as ECBC.

UNIT - V

INTERNAL CONSTRUCTION AND FINISHES

Internal elements – Internal walls – Construction joints – Internal walls, fire protection –separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door sets – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of Paints – Types of Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints –Emulsion Paints – Whitewash and Colourwash – Application of Paints –Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards such as ECBC

Textbooks:

1. Building Material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
3. A Textbook on Building Construction by S.K.Sharma, S.ChandPubilishers.
4. Building Materials by M.L.Gambhir, TMH Pubilishers.
5. ECBC (Energy Conservation Building Code).

Reference Books:

1. Building construction by W.B.Mckay, Vol.I, II, III & IV Pearson Publications, 2013 edition.
2. R.Chudly "Construction Technology" VolumesI and II" 2nd Edition, Longman, UK, 1987.
3. Building materials by S.C.Rangawala, CharotarPubilishing House, Anand- INDIA.
4. Building Construction by S.C.Rangawala, CharotarPubilishing House, Anand- INDIA
5. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
6. BEE (Bureau of Energy Efficiency) Manuals on Energy efficient building envelope concepts.

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COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-20 Civil Engineering)

Course Code		L	T	P	C
20A10303	**Engineering Workshop** (Common to CE, MECH, CHEM)	**0**	**0**	**3**	**1.5**

Pre-requisite **Semester -I**

Course Objectives:

The objectives of this course are:

	To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Apply wood working skills in real world applications.
2	Build different objects with metal sheets in real world applications.
3	Apply fitting operations in various applications.
4	Apply different types of basic electric circuit connections.
5	Understand the operation of power tools.

List of experiments:

Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lapjoint
b) Mortise and Tenonjoint
c) Corner Dovetail joint or Bridlejoint

Sheet Metal Working:

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a)Taperedtray b)Conicalfunnel
c)Elbowpipe d)Brazing

Fitting:

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fit b)Dovetailfit c) Semi-circularfit

d) Bicycle tyre puncture and change of two wheeler tyre

Electrical Wiring:

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallelandseries b) Twowayswitch c)Godownlighting

d) Tubelighte) Threephasemotorf) Soldering ofwires

Power tools:

Demonstration of a) Circular Saw b) Power Planerc) Zig Saw d) Buffing Machine

Note: In each section a minimum of three exercises are to be carried out.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-20 Civil Engineering)

Course Code		L	T	P	C
20A10508	**IT Workshop** **(Common to CE, ME, CHEM)**	**0**	**0**	**3**	**1.5**

Pre-requisite **Semester -I**

Course Objectives:

The objectives of this course are:

1.	To make the students know about the internal parts of a computer, assembling and dissembling a computer from the parts, preparing a computer for use by installing the operating system
2.	To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations and LAteX
3.	To learn about Networking of computers and use Internet facility for Browsing and Searching
4.	To learn about Google Forms and Google Sites

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
2	Prepare the Documents using Word processors and Prepare spread sheets for calculations. using excel and also the documents using LAteX.
3	Prepare Slide presentations using the presentation tool.
4	Interconnect two or more computers for information sharing.
5	Access the Internet and Browse it to obtain the required information.

Preparing your Computer

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc. should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered, Image Manipulation tools.

Task 9: Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show.

Task 10: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet

Task 11: LateX: Introduction to Latex and its installation and different IDEs. Creating first document using Latex, using content into sections using article and book class of LaTeX. Styling Pages: reviewing and customizing different paper sizes and formats. Formatting text (styles, size, alignment, colors and adding bullets and numbered items, inserting mathematical symbols, and images, etc.). Creating basic tables, adding simple and dashed borders, merging rows and columns. Referencing and Indexing: cross-referencing (refer to sections, table, images), bibliography (references).

Reference :

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, Powerpoint& Outlook Exams, Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs, Bigelows, TMH
6. Lamport L. LATEX: a document preparation system: user's guide and reference manual. Addison-wesley; 1994.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-20 Civil Engineering)

CourseCode		L	T	P	C
20A10104	Civil Engineering Workshop	0	0	3	1.5

Pre-requisite **Semester -I**

Course Objectives

The student will be able

1. To analyze the plan and carry out setting out of building with the help of tape and cross staff
2. To construct brick wall of English bond with different thickness
3. To determine the center of gravity & moment of inertia of rolled steel sections by actual measurements
4. To successfully apply the various finishing works onto a wall
5. To successfully install various plumbing fixtures like Tap, T-Joint, Elbow, Bend, threading etc.,

LIST OF EXPERIMENTS:

1) The objectives of this course are:Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape only.

2) Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape and cross staff.

3) Construct a wall of height 50 cm and wall thickness 1½ bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.

4) Construct a wall of height 50 cm and wall thickness 2 bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.

5) Computation of Centre of gravity and Moment of inertia of a given rolled steel section by actual measurements.

6) Installation of plumbing and fixtures like Tap, T-Joint, Elbow, Bend, Threading etc;

7) Plastering and Finishing of wall

8) Application of wall putty and painting a wall

9) Application of base coat and laying of Tile flooring of one square meter

10) Preparation of soil cement blocks for masonry and testing for compressive strength

11) Casting and testing of Fly ash Blocks

12) Preparation of cover blocks for providing cover to reinforcement

Course Outcomes

The student will be able to

1. Set-out a building as per the given plan using tape and cross staff
2. Construct brick wall of English bond with different thicknesses
3. Determine the center of gravity & moment of inertia of rolled steel sections by actual measurements
4. Apply the various finishing works onto a wall
5. Install various plumbing fixtures like Tap, T-Joint, Elbow, Bend, threading etc.,

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B.Tech (R-20 Civil Engineering)

Course Code		L	T	P	C
20A15302	Engineering Chemistry Lab(Common to CE, MECH, CHEM)	**0**	**0**	**3**	**1.5**

Pre-requisite **Semester -I**

Course Objectives:

The objectives of this course are:

	Verify the fundamental concepts with experiments

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	**determine** the cell constant and conductance of solutions .
2	**prepare** advanced polymer materials .
3	**determine** the physical properties like surface tension, adsorption and viscosity.
4	**estimate** the Iron and Calcium in cement .
5	**calculate** the hardness of water .

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
3. Determination of cell constant
4. Conductometric titration of strong acid vs. strong base
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a polymer
8. Determination of percentage of Iron in Cement sample by colorimetry
9. Estimation of Calcium in port land Cement
10. Preparation of nanomaterials by precipitation.
11. Adsorption of acetic acid by charcoal
12. Determination of percentage Moisture content in a coal sample
13. Determination of Viscosity of lubricating oil by Redwood Viscometer 1 &2
14. Determination of Calorific value of gases by Junker's gas Calorimeter

TEXT BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, PearsonEducation.
2. Chemistry Practical – Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera

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B.Tech (R-20 Civil Engineering)
Common to (CE, ME, CHEM)

Course Code		L	T	P	C
20A10507	C-Programming & Data Structures Lab	**0**	**0**	**3**	**1.5**

Pre-requisite **Semester -I**

Course Objectives:

The objectives of this course are:

1.	To get familiar with the basic concepts of C programming.
2.	To design programs using arrays, strings, pointers and structures.
3.	To illustrate the use of Stacks and Queues
4.	To apply different operations on linked lists.
5.	To demonstrate Binary search tree traversal techniques.
6.	To design searching and sorting techniques.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Demonstrate basic concepts of C programming language.
2	Develop C programs using functions, arrays, structures and pointers.
3	Illustrate the concepts Stacks and Queues.
4	Design operations on Linked lists.
5	Apply various Binary tree traversal techniques.
6	Develop searching and sorting methods

Week l

Write C programs that use both recursive and non-recursive functions

i) To find the factorial of a given integer.
ii) To find the GCD (greatest common divisor) of two given integers.
iii) To solve Towers of Hanoi problem.

Week 2

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
i) Addition of Two Matrices ii) Multiplication of Two Matrices

Week 3

a) Write a C program that uses functions to perform the following operations:
i) To insert a sub-string in to a given main string from a given position.
ii) To delete n characters from a given position in a given string.

Week 4

a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn‘t contain T.
b) Write a C program to count the lines, words and characters in a given text.

Week 5

a) Write a C Program to perform various arithmetic operations on pointer variables.
b) Write a C Program to demonstrate the following parameter passing mechanisms:
i) call-by-value ii) call-by-reference

Week 6

Write a C program that uses functions to perform the following operations:

i) Reading a complex number
ii) Writing a complex number
iii) Addition of two complex numbers
iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Week 7

Write C programs that implement stack (its operations) using
i) Arrays
ii) Pointers

Week 8

Write C programs that implement Queue (its operations) using
i) Arrays
ii) Pointers

Week 9

Write a C program that uses Stack operations to perform the following:
i) Converting infix expression into postfix expression
ii) Evaluating the postfix expression

Week 10

Write a C program that uses functions to perform the following operations on singly linked list.
i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 11

Write a C program that uses functions to perform the following operations on Doubly linkedlist.
i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 12

Write a C program that uses functions to perform the following operations on circular linkedlist.
i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 13

Write a C program that uses functions to perform the following:
i) Creating a Binary Tree of integers
ii) Traversing the above binary tree in preorder, inorder and postorder.

Week 14

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers:

i) Linear search
ii) Binary search

Week 15

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

i) Bubble sort
ii) Selection sort
iii) Insertion sort

Text Books:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A.Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg& Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Reference Books:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

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B.Tech (R-20 Civil Engineering)

(Common to all branches of Engineering except CSE)

Course Code		L	T	P	C
20A15102	Differential Equations and Vector Calculus	3	0	0	3

Pre-requisite **Semester -II**

Course Objectives:

The objectives of this course are:

1.	To enlighten the students in the techniques to solve differential equations.
2.	To enable the students to use differential equations in various real world applications of engineering

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	solve the differential equations related to various engineering fields.
2	Identify solution methods for partial differential equations that model physical processes.
3	interpret the physical meaning of different operators such as gradient, curl and divergence
4	estimate the work done against a field, circulation and flux using vector calculus.
5	

UNIT – I

Linear differential equations of higher order:

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

UNIT - II

Applications of Linear Differential Equations:

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications to L-C-R Circuit problems and Mass spring system.

UNIT – III :

Partial Differential Equations: First order partial differential equations, solutions of first order linear and non-linear PDEs.Solutions to homogenous and non-homogenous higher order linear partial differential equations

UNIT - IV

Vector differentiation :

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT - V

Vector integration :

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Textbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
6. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
7. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
8. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
9. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
10. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
11. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
12. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

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COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-20 Civil Engineering)
(Civil, Mechanical, Chemical)

CourseCode		L	T	P	C
20A15203	ENGINEERING PHYSICS	3	0	0	3

UNIT – I :

Wave Optics :

Interference-Principle of superposition –Interference of light – Conditions for sustained interference– Interference in thin films (Reflection Geometry)– Colors in thin films – Newton's Rings- Determination of wavelength and refractive index.

Diffraction-Introduction– Fresnel and Fraunhofer diffraction– Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum.

Polarization-Introduction– Types of polarization – Polarization by reflection, refraction and double refraction – Nicol's Prism – Half wave and Quarter wave plateswith applications.

UNIT – II :

Lasers and Fiber optics :

Lasers-Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers

Fiber optics-Introduction –Principle of optical fiber – Acceptance Angle– Numerical Aperture – Classification of optical fibers based on refractive index profile and modes –Propagation of electromagnetic wave through optical fibers–Propagation Losses (Qualitative) – Applications.

UNIT – III

Engineering Materials :

Dielectric Materials-Introduction– Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientation polarization (Qualitative) – Lorentz internal field– Clausius-Mossotti equation.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para & Ferro– Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Nanomaterials- Introduction – Surface area and quantum confinement – Physical properties: electrical and magnetic properties – Synthesis of nanomaterials: Top-down: Ball Milling – Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.

UNIT - IV

Acoustics and Ultrasonics :

Acoustics- Introduction – Requirements of acoustically good hall– Reverberation – Reverberation time – Sabine's formula (Derivation using growth and decay method) – Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedies.

Ultrasonics- Introduction – Properties – Production by magnetostriction and piezoelectric methods – Detection – Acoustic grating – Non Destructive Testing – Pulse echo system through transmission and reflection modes – Applications

UNIT - V

Crystallography and X-ray diffraction :

Crystallography- Space lattice,Basis, unit cell and lattice parameters – Bravais Lattice – Crystal systems –Packing fraction– Coordination number– Packing fraction of SC,BCC & FCC – Miller indices – Separation between successive (hkl) planes.

X-Ray Diffraction- Bragg's law – Bragg's X-ray diffractometer – Crystal structure determination by Powder method.

Textbooks:

1.Engineering Physics – Dr. M.N. Avadhanulu&Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press.

Reference Books:

Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
Engineering Physics – K. Thyagarajan, McGraw Hill Publishers
Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
Engineering Physics – M.R. Srinivasan, New Age Publications

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COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech (R-20 Civil Engineering)

(Common to CE, MECH)

Course Code		L	T	P	C
20A155501	COMMUNICATIVE ENGLISH	3	0	0	3

Pre-requisite **Semester -II**

Course Objectives:

The objectives of this course are:

1.	Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers.
2.	Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
3.	Help improve speaking skills through participation in activities such as role plays,discussions and structured talks/oral presentations
4.	Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
5.	Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
2	Apply grammatical structures to formulate sentences and correct word forms
3	Analyze discourse markers to speak clearly on a specific topic in informal discussions
4	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
5	Create a coherent paragraph interpreting a figure/graph/chart/table

UNIT – I

Lesson: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself

and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing :**Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Parts of Speech, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

UNIT - II
Lesson: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

UNIT - III
Lesson: The Death Trap: Saki

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.**Writing:** Summarizing, Paragraph Writing **Grammar and Vocabulary:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

UNIT - IV
Lesson: Innovation: Muhammad Yunus

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Letter Writing: Official Letters/Report Writing **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice

UNIT - V
Lesson: Politics and the English Language: George Orwell

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides. **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences. **Grammar and Vocabulary:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Textbooks:

1. Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan

Reference Books:

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
- Raymond Murphy's *English Grammar in Use*Fourth Edition (2012) E-book
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- Oxford Learners Dictionary, 12th Edition, 2011
- Norman Lewis *Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary* (2014)
- *Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words* by David Butler

Online Learning Resources:

- www.englishclub.com
- www.easyworldofenglish.com
- www.languageguide.org/english/
- www.bbc.co.uk/learningenglish
- www.eslpod.com/index.html
- www.myenglishpages.com

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B.Tech (R-20 Civil Engineering)

Course Code		L	T	P	C
20A10101	**STRENGTH OF MATERIALS-I**	3	0	0	3

Pre-requisite **Semester -II**

Course Objectives:

The objectives of this course are:

1.	To make the student understand how to resolve forces and moments in a given system
2.	To demonstrate the student to determine the centroid and second moment of area
3.	To impart procedure for drawing shear force and bending moment diagrams for beams.
4.	To make the student able to analyze flexural stresses in beams due to different loads.
5.	To enable the student to apply the concepts of strength of materials in engineering applications and design problems.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Understand the different types of force systems
2.	Analysis of trusses by using different methods
3	Determine the centroid and moment of inertia for different cross-sections
4	Understand the concepts of stress, strain, generalized Hooke‘s law, elastic moduli and strain energy.
5	Develop shear force and bending moment diagrams for different load cases.
6	Compute the flexural stresses for different load cases and different cross-sections.

UNIT – I

Introduction to Mechanics: Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space Resultant -Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial systems- Analysis of trusses by Method of Joints & Sections- **Friction**: Types of friction -Limiting friction -Laws of Friction -static and Dynamic

Frictions -Motion of Bodies.

UNIT - II

Centroid and Center of Gravity: Introduction – Centroids of rectangular, circular, I, L and T sections - Centroids of built up sections. **Area moment of Inertia**: Introduction – Definition of Moment of Inertia of rectangular, circular, I, L and T sections - Radius of gyration. Moments of Inertia of Composite sections

UNIT - III

Simple Stresses and Strains:

Types of stresses and strains – Hooke‘s law – Stress – strain diagram for mild steel – working stress – Factor of safety – lateral strain, Poisson‘s ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of Varying section – Composite bars – Temperature stresses. Strain energy – Resilience – Gradual, Sudden, impact and shock loadings – simple applications.

UNIT - IV

Shear Force and Bending Moment:

Definition of beam – types of beams – Concept of Shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and over changing beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – point of contra flexure – Relation between S.F, B.M and rate of loading at section of a beam

UNIT - V

Flexural Stresses:

Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/Y = E/R$ – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hallow), I, T, Angle and Channel Sections – Design of simple beam sections.

Textbooks:

1. R.K Bansal, Engineering Mechanics, Lakshmi Publications.
2. R. Subramanian, Strength of Materials, Oxford University Press.

Reference Books:

1. Shesagiri Rao, Engineering Mechanics, Universities Press, Hyderabad.
2. S. Timoshenko, D.H. Young and J.V. Rao, Engineering Mechanics, Tata McGraw-Hill Company.
3. R. K. Bansal, Strength of Materials, Lakshmi Publications House Pvt. Ltd.
4. Sadhu Singh, Strength of Materials, Khanna Publishers 11th edition 2015

Online Learning Resources:

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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B.Tech (R-20 Civil Engineering)

(Common to CE, MECH, CHEM)

Course Code		L	T	P	C
20A10301	Engineering Drawing	1	0	2	2

Pre-requisite **Semester -II**

Course Objectives:

The objectives of this course are:

1.	Bring awareness that Engineering Drawing is the Language ofEngineers.
2.	Familiarize how industry communicates technicalinformation.
3.	Teach the practices for accuracy and clarity in presenting the technicalinformation.
4.	Develop the engineering imagination essential for successfuldesign.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	draw various curves applied in engineering.
2	show projections of solids and sections graphically.
3	draw the development of surfaces of solids.

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance-Conventions in drawing-lettering - BIS conventions. a)Conic sections including the rectangular hyperbola- general methodonly,b) Cycloid, epicycloids andhypocycloid c) Involutes

UNIT - II

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

UNIT - III

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliaryviewsmethod.

UNIT - IV

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

UNIT - V

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Textbooks:

1. K.L.Narayana&P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers,2016.

Reference Books:

1. Dr K.Prahlada Rao, Dr. S. Krishnaiah, Prof.A.V.S. Prasad, Engineering Graphics, Amaravati publications.
2. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right,2009
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers,2000
4. Shah and Rana, Engineering Drawing, 2/e, Pearson Education,2009
5. K.C.John, Engineering Graphics, 2/e, PHI,2013
6. Basant Agarwal &C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Online Learning Resources:

1. Youtube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

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B.Tech (R-20 Civil Engineering)

(Common to CE, MECH, CHEM)

Course Code		L	T	P	C
20A10302	**Engineering Graphics Lab**	**0**	**0**	**2**	**1**

Pre-requisite **Semester -II**

Course Objectives:

The objectives of this course are:

1.	Instruct the utility of drafting & modelling packages in orthographic and isometric drawings.
2.	Instruct graphical representation of machinecomponents.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Use computers as a drafting tool.
2	Draw isometric and orthographic drawings using CAD packages.

Computer Aided Drafting:

Introduction to Geometric Modeling: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets,arrays,dimensions.
Dimensioning principles and conventional representations.
Orthographic Projections: Systems of projections, conventions and application to orthographic projections - simple objects.
Isometric Projections: Principles of isometric projection- Isometric scale;
Isometric views: lines, planes, simple solids.

Textbooks:

1. K. Venugopal, V.Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2. Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHI Learning, Eastern Economy editions.

Reference Books:

1. T. Jayapoovan, Engineering Graphics using Auto Cad, Vikas Publishing House
2. K.L.Narayana&P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
3. Linkan Sagar, BPB Publications, Auto Cad 2018 Training Guide.
4. K.C.John, Engineering Graphics, 2/e, PHI,2013
5. Basant Agarwal &C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Online Learning Resources:

Additional Sources: 1. Youtube: http-sewor,Carleton.cag, kardos/88403/drawings.html conic sections-online, red woods.edu.

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(Common to CE, MECH)

Course Code		L	T	P
20A15502	**COMMUNICATIVE ENGLISH LABORATORY**	0	0	3

Pre-requisite **Semester -II**

Course Objectives:

The objectives of this course are:

1.	students will be exposed to a variety of self instructional
2.	students will learn better pronunciation through stress
3.	students will be trained to use language effectively to face interviews
4.	students will be initiated into greater use of the computer in resume preparation
5.	

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Listening and repeating the sounds of English Language
2	Understand the different aspects of the English language proficiency with empha on LSRW skills
3	Apply communication skills through various language learning activities
4	Analyze the English speech sounds, stress, rhythm, intonation and syllable
5	Evaluate and exhibit acceptable etiquette essential in social and professional setting

UNIT – I

1. Phonetics
2. Reading comprehension
3. Describing objects/places/persons

UNIT - II

1. Role Play or Conversational Practice
2. JAM
3. Etiquettes of Telephonic Communication

UNIT - III

1. Information Transfer
2. Note Making and Note Taking
3. E-mail Writing

UNIT - IV

1. Group Discussions
2. Resume Writing
3. Debates

UNIT - V

1. Oral Presentations
2. Poster Presentation
3. Interviews Skills

Suggested Software

- Orell
- Walden Infotech
- Young India Films

Reference Books:

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Online Learning Resources:

- **www.esl-lab.com**
- **www.englishmedialab.com**
- **www.englishinteractive.net**

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B.Tech (R-20 Civil Engineering)
(Civil, Mechanical, Chemical)
Semester -II

Course Code		L	T	P	C
20A15204	**Engineering Physics Laboratory**	**0**	**0**	**3**	**1.5**

List of Engineering Physics Experiments

1. Determine the thickness of the wire using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Determination of dispersive power of prism.
5. Determination of wavelength of LASER light using diffraction grating.
6. Determination of particle size using LASER.
7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
8. Determination of dielectric constant by charging and discharging method.
9. Magnetic field along the axis of a circular coil carrying current –Stewart Gee's method.
10. Measurement of magnetic susceptibility by Gouy's method
11. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
12. Determination of ultrasonic velocity in liquid (Acoustic grating)
13. Sonometer: Verification of the three laws of stretched strings
14. Determination of spring constant of springs using Coupled Oscillator
15. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum

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B.Tech (R-20 Civil Engineering)
Semester -II

Subject Code	Title of the Subject	L		P	C
20A10103	**STRENGTH OF MATERIALSLABORATORY**	0	0	3	1.5

Course objectives: By the end of this course student will be able to

1. To determine the tensile strength and yield parameters of mild steel
2. To find out flexural strengths of Steel/Wood specimens and measure deflections
3. To determine the torsion parameters of mild steel bar
4. To determine the hardness numbers, impact and shear strengths of metals
5. To determine the load-deflection parameters for springs

LIST OF EXPERIMENTS :

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test.
5. Hardness test.
6. Compression test on Open coiled springs
7. Tension test on Closely coiled springs
8. Compression test on wood/ concrete
9. Izod / Charpy Impact test on metals
10. Shear test on metals
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

Course Outcomes:

1. Conduct tensile strength test and draw stress-strain diagrams for ductile metals
2. Perform bending test and determine load-deflection curve of steel/wood
3. Able to conduct torsion test and determine torsion parameters
4. Perform hardness, impact and shear strength tests and calculate hardness numbers, impact and shear strengths
5. Able to conduct tests on closely coiled and open coiled springs and calculate deflections

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B.Tech (R-20 Civil Engineering)
(Common to All Branches of Engineering)
SEMESTER-II

(Common to CE, MECH, CHEM)

Subject Code	Title of the Subject	L	T	P	C
20A19101	Universal Human Values	3	0	0	0

Learning Objectives:

1. Exposure to the value of life, society and harmony
2. Leading towards holistic perspective based on self-exploration about themselves (human being), family, and society and nature/existence.
3. Bringing transition from the present state to Universal Human Order
4. Instill commitment and courage to act.
5. Know about appropriate technologies and management patterns

COURSE OUTCOME:

1. Define terms like Natural Acceptance, Happiness and Prosperity
2. Understand awareness of oneself, and ones surroundings (family, society, nature)
3. Apply what they have learnt to their own self in different day-to-daysettings in real life
4. Relate human values with human relationship and human society.
5. Justify the need for universal human values and harmonious existence

Unit 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Universal Human Values-I - Self-Exploration - content and process; 'Natural Acceptance' and Experiential Validation - self-exploration - Continuous Happiness and Prosperity - Human Aspirations - current scenario - Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Unit 2: Understanding Harmony in the Human Being - Harmony in Myself!

human being as a co-existence of the sentient 'I' and the material'Body' - the needs - happiness and physical facility -the Body as an instrument of 'I' - the characteristics and activities of 'I' and harmony in 'I' - the harmony of I with the Body

Unit 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Values in human relationship; meaning of Justice; Trust and Respect; Difference between intention and competence; the other salient values in relationship - the

harmony in the society: Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals - Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Unit 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

the harmony in the Nature - Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature - Understanding Existence as Co-existence of mutually interacting units in all- pervasive space - Holistic perception of harmony at all levels of existence.

Unit 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

Humanistic Education - Competence in professional ethics: professional competence - people friendly and eco-friendly production systems - appropriate technologies and management patterns for above production systems. Individuals as socially and ecologically responsible engineers, technologists and managers

Textbooks :

1. *A Foundation Course in Human Values and Professional Ethics*, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

2. Teachers' Manual for *A Foundation Course in Human Values and Professional Ethics*, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

ReferenceBooks

.JeevanVidya: EkParichaya, ANagaraj, JeevanVidyaPrakashan, Amarkantak, 1999

1. HumanValues,A.N.Tripathi,NewAgeIntl.Publishers,NewDelhi,2004.
2. The Story of Stuff (Book).
3. Economy of Permanence - J C Kumarappa 8. Bharat Mein Angreji Raj - PanditSunderlal 9. Rediscovering India - byDharampal
4. Hind Swaraj or Indian Home Rule - by Mohandas K.Gandhi
5. India Wins Freedom - Maulana Abdul Kalam Azad 12. Vivekananda - Romain Rolland(English)

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(Common to CE, CHEM)

Course Code		L	T	P
20A35101	Numerical Methods and Probability Theory	3	0	0

Pre-requisite **Semester -III**

Course Objectives:

The objectives of this course are:

	This course aims at providing the student with the knowledge on various nume methods for solving equations, interpolating the polynomials, evaluation of int equations and solution of differential equations.The theory of Probability and ran variables.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	apply numerical methods to solve algebraic and transcendental equations
2	derive interpolating polynomials using interpolation formulae
3	Solve differential and integral equations numerically
4	apply Probability theory to find the chances of happening of events.
5	understand various probability distributions and calculate their statistical consta

UNIT – I

Solution of Algebraic & Transcendental Equations:

Introduction-Bisection method-Iterative method-Regula falsi method-Newton Rap method

System of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

UNIT - II

Interpolation

Finite differences-Newton's forward and backward interpolation formulae – Lagrar formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula

UNIT - III

Numerical Integration & Solution of Initial value problems to Ordinary differential equations:

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule
Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.

UNIT - IV

Probability theory:

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

UNIT - V

Random variables & Distributions:

Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties-Uniform distribution-exponential distribution

Textbooks:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Probability and Statistics for Engineers and Scientists, Ronald E. Walpole,PNIE.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

Reference Books:

1. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
2. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. nptel.ac.in/courses/117101056/17
3. http://nptel.ac.in/courses/111105090

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Course Code		L	T	P	C
20A30101	STRENGTH OF MATERIALS – II	3	0	0	3

Pre-requisite **Semester -III**

Course Objectives:

The objectives of this course are:

1.	To teach the student with basic concepts for determination of principal stresses and strains in various structural elements.
2.	To calculate deflection in beams, column and trusses.
3.	To demonstrate analytical methods for determining strength & stiffness and assess stability of structural members.
4.	To make the student analyze circular shafts subjected to torsion.
5.	To make the student determine critical loads for columns with different end conditions.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Understand the principal stresses and principal planes.
2	Determine deflection at any point on a beam under simple and combined loads
3	Analyze members under torsion, deformation in springs
4	Understand the effect of eccentricity of load in columns and apply failure criteria to implement in design of structural members.
5	Compute the crippling load of column with different conditions

UNIT – I

Compound Stresses and Strains:
Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, and its applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain.
SHEAR STRESSES: Derivation of formula for Shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections.

UNIT - II

Deflection of Beams: Uniformbending – Slope, deflection and radius of curvature – Differential equation for elastic line of a beam – Double integration and Macaulay's methods. Determination of slope and deflection for cantilever and simply supported beams under point loads, U.D.L. uniformly varying load-Mohr's theorems – Moment area method – Application to simply supported and overhanging beams- Analysis of propped cantilever beams under UDL and point loads

UNIT - III

Torsion: Theory of pure torsion – Assumptions and Derivation of Torsion formula for circular shaft – Torsional moment of resistance – Polar section modulus – Power transmission through shafts – Combined bending and torsion –. Springs -Types of springs – Deflection of close coiled helical springs under axial pull and axial couple – Carriage or leaf springs

UNIT - IV

Direct and Bending stresses:

Introduction-eccentric loading – Columns with eccentric loading – Symmetrical columns with eccentric loading about one axis –About two axes – Unsymmetrical columns with eccentric loading – Limit of eccentricity.

Theories of failure:

Maximum Principal stress theory- Maximum shear stress theory- Maximum strain theory-Maximum strain energy theory-Maximum distortion energy theory

UNIT - V

Columns and Struts:

Introduction – Classification of columns – Axially loaded compression members – Euler's crippling load theory – Derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Eccentric loading and Secant formula – Prof. Perry's formula.

Textbooks:

1. Mechanics of Materials – Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.
2. Strength of Materials by R.K Rajput, S.Chand& Company Ltd.
3. Strength of Materials by Dr. Sadhu Singh, Khanna Publishers.

Reference Books:

1) R. K. Bansal, A Text book of Strength of materials, Laxmi Publications (P) Ltd., New Delhi.
2) Strength of Materials, Fourth edition, S.S. Bhavikatti, Vikas Publishing House, Pvt. Ltd.
3) D. S. Parkas Rao Strength of Materials by, Universities Press Pvt Ltd, Hyderabad.
4) Schaum's outline series Strength of Materials, Mc Graw hill International Editions.
5) L.S. Srinath, Strength of Materials, Macmillan India Ltd., New Delhi.
6) S. Basavarajaiah and P. Mahadevappa, Strength of Materials in SI units, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2010.

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B.Tech (R-20 Civil Engineering)

Course Code		L	T	P	C
20A30102	**FLUID MECHANICS**	3	0	0	3

Pre-requisite **Semester -III**

Course Objectives:

The objectives of this course are:

1.	To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
2.	To impart ability to solve engineering problems in fluid mechanics
3.	To enable the students measure quantities of fluid flowing in pipes, tanks and channels
4.	To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces.
5.	To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Understand the principles of fluid statics, kinematics and dynamics
2	Familiarize basic terms used in fluid mechanics
3	Understand flow characteristics and classify the flows
4	Apply the continuity, momentum and energy principles
5	Estimate various losses in flow through channel

UNIT – I

Basic concepts and definitions:

Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; Variation of viscosity with temperature, Newton law of viscosity; Vapor pressure, Boiling point, Surface tension, Capillarity, Bulk modulus of elasticity, Compressibility.

UNIT - II

Fluid statics:

Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. Pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

UNIT - III

Fluid kinematics:

Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three -Dimensional continuity equations in Cartesian coordinates.

UNIT - IV

Fluid Dynamics:

Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – Derivation; Energy Principle; Practical applications of Bernoulli's equation : Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;

UNIT - V

Analysis Of Pipe Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length – Pipes in Parallel and Series.

Textbooks:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
   C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010

Reference Books:

1. Fluid Mechanics and Hydraulic Machines, S.C.Gupta, Pearson publication
2. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi.
3. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill
4. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
5. K. Subramanya, Open Channel flow, Tata Mc.Grawhill Publishers.
6. S K SOM and G Biswas, "Introduction to Fluid Mechanics and Fluid Machines", Tata McGraw Hill,New Delhi

Online Learning Resources:

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B.Tech (R-20 Civil Engineering)

Course Code		L	T	P	C
20A30103	**SURVEYING**	3	0	0	3

Pre-requisite **Semester -III**

Course Objectives:

The objectives of this course are:

1.	To make the student to get well conversant with the fundamentals of various basic methods and instruments of surveying.
2.	To introduce to the students the techniques in Plane table surveyingand Levelling
3.	To identify reduced level of the ground and its profile for finding areas and volumes of embankments and cuttings
4.	To make the student to use angular measuring instruments for horizontal and vertical control
5.	To enable the student to set simple horizontal curves

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Conversant with the fundamentals of various basic methods and instruments of surveying.
2	Understand the techniques in Plane table surveying and Leveling
3	Identify reduced level of the ground and its profile for finding areas and volumes of embankments and cuttings
4	Understand the working principles of survey instruments
5	Understand the tacheometry surveying and setting out of simple horizontal circular curves

UNIT – I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying. Measurement of Distances and Directions Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections - Prismatic

Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip.

UNIT - II

Plane table surveying: Introduction – Methods of Plane Table Surveying **-.Levelling** - Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

UNIT - III

Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes: Areas - Determination of areas consisting of irregular boundary and regular boundary, Planimeter. Volumes - Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

UNIT - IV

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

UNIT - V

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry. **Curves**: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves - Basics of Total Station .

Textbooks:

1.C.Venkatramaiah, "Text book of surveying", 2nd edition, Universities press, 2018

2.S K Duggal, "Surveying" (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004

Reference Books:

1. Arora K R "Surveying" Vol 1, 2 & 3, Standard Book House, Delhi, 2004.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain,"Surveying" (Vol – 1, 2 & 3), - Laxmi Publications (P) ltd., New Delhi.
3. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
4. Bhavikatti "Surveying" Vikas publishing house ltd.
5. R. Agor Khanna Publishers 2015 "Surveying and leveling".
6. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.

Online Learning Resources:

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Course Code		L	T	P	C
20A30104	CONCRETE TECHNOLOGY	3	0	0	3

Pre-requisite **Semester -III**

Course Objectives:

The objectives of this course are:

1.	To explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy
2.	To develop fundamental knowledge in the fresh and hardened properties of concrete
3.	To inculcate the testing methodology to evaluate the properties of concrete during fresh and hardened stage
4.	To impart the knowledge on the behavior of concrete with response to stresses developed.
5.	To impart the knowledge on the special concretes And design a concrete mix which fulfils the required properties for fresh and hardened concrete

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Understand various ingredients of concrete and their role.
2	Examine knowledge on the fresh and hardened properties of concrete.
3	Understand the long term behavior of concrete
4	Design concrete mixes using various methods.
5	Perceive special concretes for accomplishing performance levels.

UNIT – I

Ingredients of concrete:

Cement-chemical composition-hydration process-Bogue's compound-Tests on properties of cement-Types of cement - I.S. Specifications. Aggregates- Classification of aggregate – Tests on properties of aggregates - characteristics of aggregate - I.S. Specifications. Water-Quality of water - Characteristics of water - I.S. Specifications. Admixtures – Classification of chemical admixtures – Properties and limitations – Classification of mineral admixtures – Properties and limitations - I.S. Specifications.

UNIT - II

Properties of concrete:

Fresh concrete: Mixing of concrete-Workability-Factors influencing workability- Measurement of workability for conventional concrete (Slump Cone, Compaction Factor and Vee-Bee test) & SCC (V-Funnel, L-Box, U- Box, Slump Flow and J–Ring). **Hardened concrete**: Water/Cement Ratio(Abram's Law)-Gel Space Ratio-Tests on hardened concrete-Destructive Tests (Compression, Split Tensile and Flexural)-Semi Destructive Tests (Core Cutter and Pull out test) and Non Destructive Tests (Rebound Hammer-UPV - Radiological methods) .

UNIT - III

Elasticity, Shrinkage and Creep:

Curing of concrete -Methods of curing-Effects of improper curing-self curing-Modulus of Elasticity-Poisson's Ratio-Dynamic Modulus of Elasticity- Shrinkage and various types -Factors Affecting Shrinkage-Moisture Movement-Creep of Concrete-Factors Influencing Creep.

UNIT - IV

Concrete Mix Design:

Proportioning of Concrete Mixes-Factors influencing - Road Note. No. 4 and IS Code Methods-IS 456 provisions on Durability-Quality Control and Statistical Methods – Mix Design of High Strength concrete (using ACI method).

UNIT - V

Special Concretes:

Light Weight Concretes –Light Weight Aggregate Concrete- Cellular Concrete - No Fines Concrete-High Density Concrete – Fiber Reinforced Concrete-Polymer Concrete-Self Compacting Concrete and its Mix Design using EFNARC guidelines.

Textbooks:

1. A. M. Neville,"Properties of Concrete", Pearson Publication – 4th Edition
2. M.S. Shetty, A. K. Jain, "Concrete Technology Theory and Practice", S. Chand and Company Limited, New Delhi

Reference Books:

1. M. L. Gambhir, "Concrete Technology", Tata Mc. Graw Hill Publishers, New Delhi
2. N. Krishna Raju, "Design of Concrete Mixes", CBS Publishers.
3. P. K. Mehta And J. M. Monteiro, "Concrete: Micro Structure, Properties and Materials" Mc-Graw Hill Publishers
4. J. Prasad, C.G.K. Nair, "Non-Destructive Test and Evaluation of Materials", Tata Mcgraw Hill Publishers, New Delhi

Online Learning Resources:

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B.Tech (R-20 Civil Engineering)

Course Code		L	T	P	C
20A35104	Exploratory Data Analysis Lab	0	0	3	1.5

Pre-requisite **Semester –III**

COURSEDESCRIPTION: StatisticalandNumericalTechniques– Measuresofcentraltendency/dispersion, Curve fitting by method of least squares, linear regression and correlation,ANOVA; Data analysis using R, NumericalSolution of algebraic, transcendental and ordinarydifferentialequations,Inverseand Eigenvalues ofamatrix– Numerical method.

CEO 1: To impart knowledge on the application of Statistical and Numerical techniques – analysisof data, solution of algebraic, transcendental and differential equations, Matrices, transformationfromtimedomain to frequencydomain.

CEO 2: To develop skills in analyzing the data using appropriate statistical tools, solving algebraicand differential equations, matrices using appropriate numerical methods, obtaining amplitude andfrequencyofatimesignal

COURSE OUTCOMES: After completion of the course, a successful student is able to

CO1 : Developskills in designingappropriatestatistical method for
(a) Determiningthemeasuresofcentraltendency/dispersion.
(b) Box plotrepresentationusingOriginSoftware.
(c) Findingabestfitcurvetoa givensetofdata.
(d) Determiningthecoefficientofcorrelationandlinearregression.

CO2:Develop skillsinusingsuitablestatisticaltechniquefor
(a) Analyzingvariance(ANOVA)foronevariable.
(b) DeterminationofRfunctionfora givensetofdata andappropriateinterpretation.
(c) Representingthreedimensional datain contourplot usingMATLAB.

CO 3 : Transform a time signal / pulse to a frequency domain using concepts of

Fourier seriesCO4 : Develop skills usingsuitablenumerical techniquefor
(a) Solvingalgebraic,transcendentalanddifferentialequations.
(b) DeterminingEigenValuesanddominant Eigenvalueofamatrix.
(c) Differentiation,integrationandsolutionofdifferentialequations.

LIST OF EXPERIMENTS

Required softwares: SPSS, ORIGIN, MATLAB, R-LAB, MS OFFICE 2010.

I. Statistical and Fourier series Techniques:

To a given set of data:

1. Determine measures of central tendency/dispersion - Mean, Median, Mode, Range and Variance; Box plot representation using Origin Software.
2. Fit a straight line, parabola, exponential curve.
3. Determine the coefficient of correlation and regression.
4. Analysis of variance (ANOVA) for one variable.
5. Determine R function and give interpretation.
6. Transforming signal in time domain into frequency domain.
7. Represent in contour plot using MATLAB.

II. Numerical Techniques:

8. Solving algebraic and transcendental equations using Regula - Falsi and Newton - Raphson methods.
9. Determine the inverse of a matrix; solving system of algebraic equations using Gauss- Siedal method.
10. Determine the Eigen values of a matrix and dominant Eigen value by power method.
11. Numerical differentiation and integration.
12. Numerical solution of Ordinary differential equations - Modified Euler method & R-K fourth order method.

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Subject Code	Title of the Subject	L	T	P	C
20A30105	**SURVEYING LAB**	0	0	3	1.5

Semester-III

Course objectives:

1. To find the area of a given boundary through Plane Table Survey and solve two point problem
2. To determine the RLs of different points through fly leveling
3. To draw longitudinal and cross sections of Road profile
4. To determine the horizontal & vertical angles with a Theodalite and find heights and distances via Tachometry
5. To determine areas and remote heights using total station traversing

LIST OF EXPERIMENTS:

1. Plane table survey; finding the area of a given boundary
2. Two Point Problem by the plane table survey.
3. Fly leveling: Height of the instrument method and rise and fall method.
4. Fly leveling: Longitudinal Section and Cross sections of a given road profile.
5. Theodolite Survey: Determining the Horizontal and Vertical Angles
6. Finding the distance between two inaccessible points using Theodolite
7. Tachometric survey: Heights and distance problems using tachometric principles.
8. Total Station Determination of area using total station. Traversing and Contouring
9. Total Station: Determination of Remote height.
10. Developing a Contour map

Course Outcomes:

1. Conduct Plane Table Survey and determine areas and be able to solve two point problem
2. Perform fly leveling and determine RLs of different locations and draw contour maps
3. Able to use fly Levels and draw Longitudinal and Cross section profiles of Roads
4. Perform Theodalite survey and measure horizontal & vertical angles and compute heights and distances through Tachometry
5. Able to handle Total Station for complete survey of a given Topography

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Semester-III

Subject Code	Title of the Subject	L	T	P	C
20A30106	**Concrete Technology Lab**	0	0	3	1.5

Course Objectives: By the end of this course student will be able to

1. To determine the Physical Properties such as Specific gravity, Grading curve and Bulking of Coarse and Fine Aggregates for use in concrete
2. To determine Physical properties of cement such as specific gravity, Fineness, soundness and consistency
3. To determine setting times of cement
4. To determine compressive strength of cement for its Grade
5. To determine workability and Compressive strength of Concrete

LABORATORY EXPERIMENTS

1. Grading Curve of Coarse aggregates and Fine aggregates
2. Bulking of Fine aggregate
3. Specific gravity of coarse aggregate and Fine aggregate
4. Specific gravity of Cement
5. Fineness and Soundness test of Cement
6. Normal Consistency of Cement
7. Initial and final setting times of Cement
8. Compressive Strength test of Cement
9. Workability Test on Fresh Concrete
10. Compressive Strength test of Concrete

Course Outcomes :

1. Conduct sieve analysis and other physical tests and draw the Grading curve & obtain properties of given Coarse and Fine aggregate samples

2. Perform tests on cement and determine its specific gravity, Fineness, soundness and consistency

3. Able to perform setting time tests with Vicat Apparatus and determine the setting times
4. Conduct compressive strength test on cement and identify its Grade.
5. Conduct slump & compaction factor tests and compressive strength tests for assessing the quality of concrete in both fresh and hardened states

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Semester-III

Subject Code	Title of the Subject	L	T	P	C
20A30107	**Building Planning and Drawing**	1	0	2	2

Course Objective:
To impart the practical knowledge in detailing and drawing of various components of building and Different types of Buildings.

1. Detailing & Drawing of Sign Conventions.
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.
4. Detailing & Drawing of Doors.
5. Detailing & Drawing of Windows.
6. Detailing & Drawing of Ventilators &Roofs.
7. Drawing of Line Diagram of Residential Buildings by using Building Bye- Laws.
8. Drawing of Plan, Elevation & Section from line diagram for a single Storey Building.
9. Drawing of Plan, Elevation & Section for Hospital Building.
10. Drawing of Plan, Elevation & Section for Industrial Building.

Course Outcomes:
At the end of the course, the student will be able to apply the knowledge in detailing and drawing of various components of building and Different types of Buildings.

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Semester-III

(Common to CE, MECH, CHEM)

Subject Code	Title of the Subject	L	T	P	C
20A10803	**Environmental Science**	3	0	0	0

Course Objectives:

The objectives of this course are:

	To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by theengineers

UNIT – I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: – Definition, Scope and Importance – Need for Public Awareness.
NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT - II
ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:
a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
BIODIVERSITY AND ITS CONSERVATION : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of

Biodiversity.

UNIT - III

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

SOLID WASTE MANAGEMENT : Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT - IV

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT - V

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK : Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Textbooks:

(1) Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, Universities Press.
(2) Environmental Studies by Palaniswamy – Pearson education
(3) Environmental Studies by Dr.S.AzeemUnnisa, Academic Publishing Company

Reference Books:

(1) Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Pubilications.
(2) Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
(3) Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.

(4) Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
(5) A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Pubilishing House
(6) Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

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Semester-IV

Course Code		L	T	P	C
20A40101	**Geological Sciences for Civil Engineers**	3	0	0	3

Pre-requisite **Semester -IV**

Course Objectives:

The objectives of this course are:

1.	Type of rocks,civil engineering importance of rock forming minerals.
2.	Geological structures, reasons of formation for each type and their side effects on the engineering projects
3.	.Study ground water, factors affecting on the variation of water table depth methods of searching for ground water.
4.	Study the geophysical investigation methods
5.	Study the dams and geology of dam site.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Understand principles of engineering geology.
2	Understand properties of various rocks and minerals
3	Understand the suitability of sites for various civil engineering structures
4	Understand geological strata in the analysis and design the civil engineering structures.
5	Understand the concept of remote sensing and GIS

UNIT – I

INTRODUCTION:

Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS: Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like “Granite”

MINERALOGY:

Definition of mineral, Importance of study of minerals, Different methods of study of minerals.

Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT - II

PETROLOGY:

Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

STRUCTURAL GEOLOGY:

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults un conformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT - III

GROUND WATER, EARTH QUAKE & LAND SLIDES:-

Groundwater, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT - IV

GEOPHYSICAL STUDIES:-

Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and geothermal method. Special importance of Electrical resistivitymethods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

UNIT - V

GEOLOGY OF DAMS, RESERVOIRS AND TUNNELS:

Types of dams and importance of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

Textbooks:

1. Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
1. Engineering geology by Duggal, TMH Publishers.
2. Engineerring Geology by Vasudev Kanthi, Universities press, Hyderabad.

Reference Books:

1. Engineerring geology by Prabinsingh, KatsonPubilcations
2. Engineering Geology by SubinoyGangopadhyay, Oxford University press.
3. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications
4. K. S. Valdiya, " Environmental Geology",, Tata Mc Grew Hills.

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Course Code		L	T	P	C
20A40102	STRUCTURAL ANALYSIS	3	0	0	3

Pre-requisite **Semester -IV**

Course Objectives:

The objectives of this course are:

1.	Ability to understand the concepts of various classical methods for indeterminate structures.
2.	Ability to analyse whether a structures is statically determinate or in-determinates.
3.	Ability to analyse statically determinate trusses, beams and frames and obtain internal reactions.
4.	Ability to determine shear and moment functions and diagrams for beams for beam structures.
5.	Ability to evaluate deflection of beams and frames using classical methods.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

CO1	Apply energy theorems for analysis of indeterminate structures
CO2	Analyse whether a structures is statically determinate or in-determinates.
CO3	Analyze indeterminate structure with yielding of supports
CO4	Analyze the beams and frames by using slope deflection distribution method
CO5	Analyze the beams and frames by using moment distribution method

UNIT – I

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT - II

ANALYSIS OF INDETERMINATE STRUCTURES: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano's theorem.

UNIT - III

FIXED BEAMS & CONTINUOUS BEAMS : Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT - IV

SLOPE-DEFLECTION METHOD: Introduction-derivation of slope deflection equations-application to continuous beams with and without settlement of supports - Analysis of single bayportal frames without sway.

UNIT - V

MOMENT DISTRIBUTION METHOD: Introduction to moment distribution method-Application to continuous beams with and without settlement of supports-Analysis of single bay storey portal frames without sway.

Textbooks:

(1) Analysis of Structures – Vol-I&II by V.N.Vazirani&M.M.Ratwani, Khanna Publications, New Delhi.
(2) Structural Analysis by S SBhavikatti – Vikas Publishing House.
(3) Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

Reference Books:

(1) Structural analysis – Hibbler – Pearson education
(2) Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
(3) Structural Analysis – D.S.Prakasarao - Univeristy press.
(4) Introduction To Structural Analysis-Nautial- New Age Pubilishers
(5) Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, NewDelhi.
(6) Structual analysis Vol.I and II by Dr.R.Vaidyanathan and Dr.P Perumal – Laxmi publications.
(7) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.

Online Learning Resources:

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Course Code		L	T	P	C
20A40103	HYDRAULICS AND HYRAULIC MACHINERY	3	0	0	3

Pre-requisite **Semester -IV**

Course Objectives:

The objectives of this course are:

1.	To Introduce concepts of laminar and turbulent flows
2.	To teach principles of uniform flows through open channel.
3.	To teach principles of non-uniform flows through open channel.
4.	To impart knowledge on design of turbines.
5.	To impart knowledge on design of pumps

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1.	Understand characteristics of laminar and turbulent flows.
2.	Understand different formulae on open channel flow and design open-channel flow systems
3.	Understand the concepts of varying flow in pipes and Measure discharge and velocity
4.	Understand hydrodynamic force of jets different vanes and design Pelton wheel, Francis and Kaplan turbine
5.	Understand principles of centrifugal pumps and Calculate losses and efficiencies of centrifugal pumps

UNIT – I

Laminar & Turbulent flow in pipes:

Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody's diagram – Introduction to boundary layer theory.

UNIT - II

Uniform flow in Open Channels:

Open Channel Flow - Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow,

Velocity Distribution of channel section. Hydraulically efficient channel sections**:** Rectangular, trapezoidal and triangular channels, Energy and Momentum correction factors

UNIT - III

Non-Uniform flow in Open Channels:

Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics- Energy dissipation.

UNIT - IV

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Velocity triangles at inlet and outlet - Work done and efficiency

Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design - efficiency - Draft tube: theory - characteristic curves of hydraulic turbines. Cavitation: causes and effects.

UNIT - V

pumps:

Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies

Textbooks:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2. K. Subramanya, Open channel Flow, Tata McGraw Hill.

Reference Books:

1. Rajput, Fluid mechanics and fluid machines , S. Chand & Co
2. D. S. Kumar Fluid Mechanics & Fluid Power Engineering, Kataria& Sons.
3. Srinivasan, Open channel flow by, Oxford University Press
4. Banga & Sharma, Hydraulic Machines, Khanna Publishers.
5. Fluid Mechanics and Hydraulic Machines, S.C.Gupta, Pearson publications,
6. R.K. Bansal, “A Text book of Fluid Mechanics and Hydraulic Machines”, Laxmi Publications, New Delhi

Online Learning Resources:

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Course Code		L	T	P	C
20A40104	**ENVIRONMENTAL ENGINEERING**	3	0	0	3

Pre-requisite **Semester -IV**

Course Objectives:

The objectives of this course are:

1.	To teach requirements of water and its treatment.
2.	To impart knowledge on sewage treatment methodologies
3.	To impart knowledge on basic concepts about sewerage system
4.	To enable with design concepts of wastewater treatment UNITs
5.	To throw light on importance of plumbing

Course Outcomes (CO):

On Completion of the course, the students will be able to:

CO1	Understand about quality of water and purification process
CO2	Select appropriate technique for treatment of waste water.
CO3	Estimate sewage Generation and understand the Characteristics and Composition of sewage
CO4	Understand consequences of solid waste and its management
CO5	Design domestic plumbing systems.

UNIT – I

Water quality and treatment:

Water quality: Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system

Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes

UNIT - II

Sewage and Treatment-I

Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems

UNIT - III

Sewage and Treatment-II

Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, Wastewater treatment – COD & BOD- Aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – Quality requirements for various purposes.

UNIT - IV

Solid Waste Management-

Municipal solid waste-Composition - Chemical and physical parameters - Collection, transport, treatment and disposal. waste from commercial establishments and other urban zones-Construction activities - Biomedical wastes, Effects of solid waste on environment. Disposal of solid waste- Disposal methods- Integrated solid waste management.

UNIT - V

Domestic Plumbing

Types of home plumbing systems for water supply and waste water disposal, high rise building plumbing-Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings. Role of Government authorities in water supply, sewerage disposal.

Textbooks:

1. G. S. Birdi,"Water supply and sanitary Engineering", Dhanpat Rai & Sons Publishers.
2. Peavy, H.S, Rowe, D. R. Tchobanoglous, "Environmental Engineering", Mc-Graw –Hill International Editions, New York 1985.

Reference Books:

1. B.C. Punmia, Ashok Jain & Arun Jain, "Water Supply Engineering", Vol. 1, Waste water Engineering, Vol. II, Laxmi Publications Pvt. Ltd, New Delhi.
2. MetCalf and Eddy,"Wastewater Engineering", Treatment, Disposal and Reuse, Tata McGraw- Hill, New Delhi.
3. S. M. Patil, "Plumbing EngineeringTheory, Design and Practice",1999.
4. K. N. Duggal, "Elements of Environmental Engineering", S. Chand Publishers.

Online Learning Resources:

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(Common to All Branches)

Course Code		L	T	P	C
20A49101a	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**	3	0	0	3

Pre-requisite **Semester -IV**

Course Objectives:

The objectives of this course are:

1.	To inculcate the basic knowledge of micro economics and financial accounting
2.	To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
3.	To know the various types of Market Structures & pricing methods and its strategies
4.	To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
5.	To provide fundamental skills on Accounting and to explain the process of preparing Financial statements

COURSE OUTCOMES: At the end of the course, students will be able to

CO1	Understand the fundamentals of Economics and Managerial economics viz., Demand, Production, cost, revenue and markets
CO2	Apply the Concept of Production cost and revenues for effective Business decision
CO3	Analyze how to invest their capital and maximize returns.
CO4	Evaluate the capital budgeting techniques
CO5	Develop the accounting statements and evaluate the financial performance of business entity.

UNIT – I

Managerial Economics

Introduction – Nature, meaning, significance, functions and advantages. Demand-Concept, Function, Law of Demand – DemandElasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

LEARNING OUTCOMES: At the end of the Unit, the learners will be able to

State the Nature of Managerial Economics and its importance

- Understand the concept of demand andits determinants
- Analyze the Elasticity and degree of elasticity
- EvaluateDemand forecasting methods
- Design the process of demand estimation for different types of demand

UNIT - II

Production and Cost Analysis

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least-cost combination–Shortrun and longrun Production Function- Isoquants andIsocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale. Cost&Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

UNIT - III

Business Organizations and Markets

Introduction – Nature, meaning, significance, functions and advantages.Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises.Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition – Monopoly-Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies.

UNIT - IV

Capital Budgeting

Introduction – Nature, meaning, significance, functions and advantages. Typesof Working Capital,Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals,Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT - V

Financial Accounting and Analysis

Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions-Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). ***Financial Analysis*** **-** Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

1. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019

Reference Books:

1. Ahuja Hl Managerial economics Schand,3/e,2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.

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B.Tech (R-20 Civil Engineering)

(Common to All Branches)

Course Code		L	T	P	C
20A49101b	**ENTREPRENEURSHIP& INCUBATION**	3	0	0	3

COURSE OBJECTIVES: The objective of this course is	
1	To make the student understand about Entrepreneurship
2	To enable the student in knowing various sources of generating new ideas in setting up ofnew enterprise
3	To facilitate the student in knowing various sources of finance in starting up of a business
4	To impart knowledge about various government sources which provide financial assistance to entrepreneurs/ women entrepreneurs
5	To encourage the student in creating and designing business plans

COURSE OUTCOMES: At the end of the course, students will be able to	
CO1	Define the Concepts related to the Entrepreneurship and Incubators
CO2	Understand the concept of Entrepreneurship and challenges in the world of competition.
CO3	Apply the Knowledge in generating ideas for New Ventures.
CO4	Analyze various sources of finance and subsidies to entrepreneur/women Entrepreneurs.
CO5	Evaluate the role of central government and state government in promoting Entrepreneurship.
CO6	Create and design business plan structure through incubations.

UNIT-I: Entrepreneurship

Introduction-Nature, meaning, significance, functions and advantages. concept, characteristics-knowledge and skills requirement - process - Factors supporting entrepreneurship - Differences between Entrepreneur and Intrapreneur - entrepreneurial mindset and personality - Recent trends.

LEARNING OUTCOMES

At the end if the Unit, the learners will be able to

- Understand theconcept of Entrepreneur and Entrepreneurship in India
- Analyzerecent trends in Entrepreneurship across the globe
- Develop a creative mind set and personality in starting a business.

UNIT-II: Women Entrepreneurship

Introduction – Nature, meaning, significance, functions and advantages. Growth of women entrepreneurship in India. - Issues & Challenges - Entrepreneurial motivations.Entrepreneurship Development and Government. Role, of Central and State Government - incentives, subsidies and grants – Export-oriented Units - Fiscal and Tax concessions.

LEARNING OUTCOMES

At the end of the Unit, the learners will be able to

- Understand the role of government in promoting women entrepreneurship
- Analyze the role of export-oriented units
- Evaluate the tax concessions available for Women entrepreneurs

UNIT-III:Product Development

Introduction – Nature, meaning, significance, functions and advantages. Startup Initiatives - Generating business/ Service idea – Sources and methods –Identifying opportunities - Feasibility study - Market feasibility, technical/operational feasibility, Financial feasibility. Developing business plan, Preparing project report, Presenting business plan to investors.

LEARNING OUTCOMES

At the end if the Unit, the learners will be able to

- Analyze the sources of new methods in generating business idea
- Evaluate market feasibility, financial feasibility and technical feasibility
- Design and draw business plansinproject preparation and prepare project reports

UNIT-IV:Startups

Introduction – Nature, meaning, significance, functions and advantages. Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation and the business incubator and how they operate and influence theType/benefits of incubators - Corporate/educational / institutional incubators - Broader business incubation environment - Pre-Incubation and Post - Incubation process - Idea lab, Business plan structure -Value proposition

LEARNING OUTCOMES

At the end of the Unit, the learners will be able to:

- Understand the importance of business incubation
- Apply brilliant ideas in the process of business incubation
- Analyze the process of business incubation/incubators.
- Design their own business incubation/incubators as viable-business unit.

UNIT-V: Finance

Introduction – Nature, meaning, significance, functions and advantages. Sources - Long term and Short term - Institutional Finance – Commercial Banks, SFC's and NBFC's in India, Role in small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions supporting entrepreneurship development.

LEARNING OUTCOMES

At the end of the Unit, the learners will be able to

- Understand the various sources of finance in Starting the new venture
- Analyze the role of banks and other financial institutions in promoting entrepreneurship in India
- Evaluatethe need and importance of MSMEs in the growth of country

TEXT BOOKS

1. D F Kuratko and T V Rao, **Entrepreneurship** - A South-Asian Perspective – Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit :login.cengage.com)

2 .Nandan H, Fundamentals of Entrepreneurship, PHI, 2013

REFERENCES

1.Vasant Desai,Small Scale Industries and Entrepreneurship, Himalaya Publishing 2012.
2. Rajeev Roy Entrepreneurship, 2nd Edition, Oxford, 2012.
3.B.JanakiramandM.Rizwana‖ Entrepreneurship Development: Text & Cases, Excel Books, 2011.
4.Stuart Read, Effectual Entrepreneurship, Routledge, 2013.

E-RESOURCES

1. Entrepreneurship-Through-the-Lens-of-enture Capital
2.http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship
3.http://nptel.ac.in/courses/122106032/Pdf/7_4.pd
4.http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurhip/50

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Course Code		L	T	P	C
20A49101c	**BUSINESS ETHICS AND CORPORATE GOVERNANCE**	3	0	0	3

Pre-requisite **Semester -IV**

Course Objectives:

The objectives of this course are:

1.	To make the student understand the principles of business ethics
2.	To enable them in knowing the ethics in management
3.	To facilitate the student's role in corporate culture
4.	To impart knowledge about the fair-trade practices
5.	To encourage the student in creating knowing about the corporate governance

UNIT – I

ETHICS

Introduction – Meaning – Nature, Scope, significance, Loyalty, and ethical behavior - Value systems - Business Ethics,Types, Characteristics, Factors, Contradictions and Ethical Practices inManagement- Corporate Social Responsibility – Issues of Management – Crisis Management.

UNIT - II

ETHICS IN MANAGEMENT

Introduction Ethics in production, finance, Human Resource Management and, Marketing Management - Technology Ethics and Professional ethics - The Ethical Value System – Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individual Ethics.

UNIT - III

CORPORATE CULTURE

Introduction, Meaning,definition,Nature, Scope, Functions,andsignificance–
Cross cultural issues in Ethics - - Emotional Honesty – Virtue of humility – Promote happiness –

karma yoga – proactive – flexibility and purity of mind. The Ethical Value System – Universalism, Utilitarianism, Distributive
Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individual Ethics.

UNIT - IV
LEGAL FRAME WORK
Law and Ethics, Agencies enforcing Ethical Business Behavior, Legal Impact– Environmental Protection, Fair Trade Practices,legal Compliances, Safeguarding Health and wellbeing of Customers.

UNIT - V
CORPORATE GOVERNANCE
Introduction, meaning – scope Nature - Issues, need, corporate governance code, transparency & disclosure, role of auditors, board of directors and shareholders. Global issues, accounting and regulatory frame work, corporate scams, committees in India and abroad, corporate social responsibility. of BoDs composition, Cadbury Committee - various committees - reports - Benefits and Limitations.

Textbooks:
1. Murthy CSV: Business Ethics and Corporate Governance, HPH
2. Bholananth Dutta, S.K. Podder – Corporation Governance, VBH.

Reference Books:
1.Dr. K. Nirmala, KarunakaraReddy: Business Ethics and Corporate Governance, HPH
2. H.R.Machiraju: Corporate Governance
3. K. Venkataramana, Corporate Governance, SHBP.
4. N.M.Khandelwal : Indian Ethos and Values for Managers

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Semister-IV

Subject Code		L	T	P	C
20A40105	**FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**	0	0	3	1.5

OBJECTIVE:By the end of this course student will be able

1. To determine coefficient of discharge for Venturimeter and orifice meter.
2. To determine coefficient of discharge for small orifice and mouth piece
3. To determine discharge co-efficient of Notches
4. To determine the efficiency of Pelton wheel Turbine and centrifugal pump
5. To evaluate impact of jets on vanes in different angles

LABORATORY EXPERIMENTS

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Verification of Bernoulli's equation.
8. Impact of jet on vanes.
9. Performance test on Pelton wheel turbine.
10. Efficiency test on centrifugal pump.

Course Outcomes:-

1. Perform flow tests and determine coefficient of discharge for venturimeter and orifice meters
2. Conduct flow tests and determine Coefficient of discharge for a small orifice and external mouthpiece.
3. Perform tests on rectangular & triangular notches and evaluate flow regimes
4. Evaluate the efficiency of Pelton wheel turbine and centrifugal pumps
5. Conduct impact of jets test on Vanes located in different angles and draw velocitytriangles

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Semester-IV

Subject Code		L	T	P	C
20A40106	**ENVIRONMENTAL ENGINEERING LAB**	0	0	3	1.5

OBJECTIVES: The object of the course is to enable the students

1. To determine water quality parameters such as pH, conductivity, Alkalinity and Total Hardness
2. To determine chlorides content in water sample.
3. To determine COD and BOD values for water/waste water
4. To determine optimum coagulant dose for water treatment
5. To determine DO and chlorine demand

LABORATORY EXPERIMENTS

1. Determination of pH and Electrical Conductivity (Salinity) of Water.
2. Determination and estimation of Total Hardness–Calcium & Magnesium.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides in water and soil
5. Determination and Estimation of total solids.
6. Determination of Dissolved Oxygen with D.O. Meter &Wrinklers Method and B.O.D.
7. Physical parameters – Temperature, Color, Odour, Turbidity, Taste.
8. Determination of C.O.D.
9. Determination of Optimum coagulant dose.
10. Determination of Chlorine demand.

Course Outcomes (CO):

1. Conduct water quality tests and calculate pH, conductivity, Alkalinity and Total Hardness of given water sample
2. Perform tests and find out Chlorides content in a given water sample
3. Able to use apparatus and determine COD and BOD of water/waste water
4. Derive optimum coagulant dose for treatment of water/waste water
5. Compute dissolved oxygen and chlorine demand from laboratory tests

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Semester-IV

Subject Code		L	T	P	C
20A40107	**GEOLOGICAL SCIENCES LAB**	0	0	3	1.5

Course Objectives

1. Enable the students to understand physical properties of minerals and identify the same
2. Familiarize the students with different igneous rocks & their properties and enable them to identify igneous rocks
3. Familiarize the students with different sedimentary rocks & their properties and enable them to identify such sedimentary rocks
4. Teach physical properties of different metamorphic rocks & their properties and enable them with skills to identify metamorphic rocks.
5. Drawing sections for geological maps showing tilted beds, faults, uniformities etc., and solve Simple Structural Geology problems.

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List of Experiments:

1. Study of physical properties and identification of following minerals referred under theory.

   A) Feldspar B)Garnet C) Kyanite D) Amethyst
2. Study of physical properties and identification of following minerals referred under theory.

   A) Talc B) Muscovite Mica C) Bauxite D) Rose Quartz
3. Study of physical properties and identification of following minerals referred under theory.

   A) Asbestos B) Magnetite C) Pyrite D) Flint
4. Study of physical properties and identification of following minerals referred under theory.

   A) Gypsum B) Biotite Mica C) Calcite D) Smoky Quartz
5. Study of physical properties and identification of following minerals referred under theory.

A) Graphite B) Galena C) Transparent Quartz D) Hematite

6. Megascopic description and identification of Igneous Rocks referred under theory.

A) Granite B) Dolerite C) Basalt D) Pink Granite E) Vesicular Basalt

7. Megascopic description and identification of Sedimentary Rocks referred under theory.

A) Shale B) Lime Stone C) Sand Stone D) Conglomerate

8. Megascopic description and identification of Metamorphic Rocks referred under theory.

A) Gneiss B) Schist C) Quartzite D) Marble

9. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.

10. Simple Structural Geology problems.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

COURSE OUTCOMES

Upon successful completion of this course, student will be able to:

1. Identify the minerals based on their physical properties by simple tests
2. Understand the physical properties of igneous, sedimentary and metamorphic rocks
3. Classify rocks using basic geologic classification systems.
4. Interpret the geological structures in the geological maps and sections.
5. Solve various geological problems involving strike and Dip.

Books:-

1. Elementary Exercises in Geology by CVRK Prasad, Universities press.
2. B.S.SatyanarayanaSwamy, Engineering Geology Laboratory Manual , DhanpatRai Sons, New Delhi

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Semester-IV

Subject Code		L	T	P	C
20A40108	**Python Programming**	1	0	2	2

Course Objectives:

- To learn the basic concepts of software engineering and life cycle models
- To explore the importance of Databases in application Development
- Acquire programming skills in core Python
- To understand the importance of Object-oriented Programming
-

Course Outcomes (CO):

Students should be able to

- Identify the issues in software requirements specification and enable to write SRS documents for software development problems
- Explore the use of Object oriented concepts to solve Real-life problems
- Design database for any real-world problem
- Solve mathematical problems using Python programming language

Module 1.Basic concepts in software engineering and software project management

Basic concepts: abstraction versus decomposition, the evolution of software engineering techniques, Software development life cycle
Software project management: project planning and project scheduling

Task:

1. Identifying the Requirements from Problem Statements

Module 2. Basic Concepts of Databases

Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Relational Databases, Data Definition Language(DDL) Statements: (Create table, Alter table, Drop table), Data Manipulation Language(DML) Statements

Task:

1. Implement Data Definition Language(DDL) Statements: (Create table, Alter table, Drop table)
2. Implement Data Manipulation Language(DML) Statements

Module 3. Python Programming:

a. **Introduction to Python:** Features of Python, Data types, Operators, Input and output, Control Statements, Looping statements
b. **Python Data Structures:** Lists, Dictionaries, Tuples.

c. **Strings:** Creating strings and basic operations on strings, string testing methods.

d. **Functions:** Defining a function- Calling a function- Types of functions-Function Arguments-Anonymous functions- Global and local variables

e. **OOPS Concepts;** Classes and objects- Attributes- Inheritance- Overloading- Overriding- Data hiding

f. **Modules and Packages:** Standard modules-Importing own module as well as external modules Understanding Packages Powerful Lamda function in python Programming using functions, modules and external packages

g. **Working with Data in Python:** Printing on screen- Reading data from keyboard- Opening and closing file- Reading and writing files- Functions-Loading Data with Pandas-Numpy

Tasks:

1. OPERATORS

a. Read a list of numbers and write a program to check whether a particular element is present or not using membership operators.
b. Read your name and age and write a program to display the year in which you will turn 100 years old.
c. Read radius and height of a cone and write a program to find the volume of a cone.
d. Write a program to compute distance between two points taking input from the user (Hint: use Pythagorean theorem)

2. CONTROL STRUCTURES

a. Read your email id and write a program to display the no of vowels, consonants, digits and white spaces in it using if…elif…else statement.
b. Write a program to create and display a dictionary by storing the antonyms of words. Find the antonym of a particular word given by the user from the dictionary using while loop.
c. Write a Program to find the sum of a Series 1/1! + 2/2! + 3/3! + 4/4! +…….+ n/n!. (Input :n = 5, Output : 2.70833)
d. In number theory, an abundant number or excessive number is a number for which the sum of its proper divisors is greater than the number itself. Write a program to find out, if the given number is abundant. (Input: 12, Sum of divisors of 12 = 1 + 2 + 3 + 4 + 6 = 16, sum of divisors 16 > original number 12)

3: LIST

a. Read a list of numbers and print the numbers divisible by x but not by y (Assume x = 4 and y = 5).
b. Read a list of numbers and print the sum of odd integers and even integers from the list.(Ex: [23, 10, 15, 14, 63], odd numbers sum = 101, even numbers sum = 24)
c. Read a list of numbers and print numbers present in odd index position. (Ex: [10, 25, 30, 47, 56, 84, 96], The numbers in odd index position: 25 47 84).
d. Read a list of numbers and remove the duplicate numbers from it. (Ex: Enter a list with duplicate elements: 10 20 40 10 50 30 20 10 80, The unique list is: [10, 20, 30, 40, 50, 80])

4: TUPLE

a. Given a list of tuples. Write a program to find tuples which have all elements divisible by K from a list of tuples. test_list = [(6, 24, 12), (60, 12, 6), (12, 18, 21)], K = 6, Output : [(6, 24, 12), (60, 12, 6)]
b. Given a list of tuples. Write a program to filter all uppercase characters tuples from given list of tuples. (Input: test_list = [(“GFG”, “IS”, “BEST”), (“GFg”, “AVERAGE”), (“GfG”,), (“Gfg”, “CS”)], Output : [(„GFG“, „IS“, „BEST“)]).
c. Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input : tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output : 3)

5: SET

a. Write a program to generate and print a dictionary that contains a number (between 1 and n) in the form (x, x*x).
b. Write a program to perform union, intersection and difference using Set A and Set B.
c. Write a program to count number of vowels using sets in given string (Input : “Hello World”, Output: No. of vowels : 3)
d. Write a program to form concatenated string by taking uncommon characters from two strings using set concept (Input : S1 = "aacdb", S2 = "gafd", Output : "cbgf").

6: DICTIONARY

a. Write a program to do the following operations:
   1. Create a empty dictionary with dict() method
   ii. Add elements one at a time
   iii. Update existing key‟s value
   iv. Access an element using a key and also get() method
   v. Deleting a key value using del() method

b. Write a program to create a dictionary and apply the following methods:
i. pop() method
   ii. popitem() method
   iii. clear() method

c. Given a dictionary, write a program to find the sum of all items in the dictionary.
d. Write a program to merge two dictionaries using update() method.

7: STRINGS

a. Given a string, write a program to check if the string is symmetrical and palindrome or not. A string is said to be symmetrical if both the halves of the string are the same and a string is said to be a palindrome string if one half of the string is the reverse of the other half or if a string appears same when read forward or backward.
b. Write a program to read a string and count the number of vowel letters and print all letters except 'e' and 's'.
c. Write a program to read a line of text and remove the initial word from given text. (Hint: Use split() method, Input : India is my country. Output : is my country)
d. Write a program to read a string and count how many times each letter appears. (Histogram).

8: USER DEFINED FUNCTIONS

a. A generator is a function that produces a sequence of results instead of a single value. Write a generator function for Fibonacci numbers up to n.
b. Write a function merge_dict(dict1, dict2) to merge two Python dictionaries.
c. Write a fact() function to compute the factorial of a given positive number.
d. Given a list of n elements, write a linear_search() function to search a given element x in a list.

9: BUILT-IN FUNCTIONS

a. Write a program to demonstrate the working of built-in statistical functions mean(), mode(), median() by importing statistics library.
b. Write a program to demonstrate the working of built-in trignometric functions sin(), cos(), tan(), hypot(), degrees(), radians() by importing math module.
c. Write a program to demonstrate the working of built-in Logarithmic and Power functions exp(), log(), log2(), log10(), pow() by importing math module.
d. Write a program to demonstrate the working of built-in numeric functions ceil(), floor(), fabs(), factorial(), gcd() by importing math module.

10. CLASS AND OBJECTS

a. Write a program to create a BankAccount class. Your class should support the following methods for
   1’. Deposit

2. Withdraw
3.GetBalanace
4.PinChange

b. Create a SavingsAccount class that behaves just like a BankAccount, but also has an interest rate and a method that increases the balance by the appropriate amount of interest (Hint:use Inheritance).
c. Write a program to create an employee class and store the employee name, id, age, and salary using the constructor. Display the employee details by invoking employee_info() method and also using dictionary (__dict__).
d. Access modifiers in Python are used to modify the default scope of variables. Write a program to demonstrate the 3 types of access modifiers: public, private and protected.

11. FILE HANDLING

a. . Write a program to read a filename from the user, open the file (say firstFile.txt) and then perform the following operations:
   i. Count the sentences in the file.
   ii. Count the words in the file.
   iii. Count the characters in the file.
b. . Create a new file (Hello.txt) and copy the text to other file called target.txt. The target.txt file should store only lower case alphabets and display the number of lines copied.
c. Write a Python program to store N student‟s records containing name, roll number and branch. Print the given branch student‟s details only.

References:

1. Rajib Mall, “Fundamentals of Software Engineering”, 5th Edition, PHI, 2018.
2. RamezElmasri, Shamkant, B. Navathe, “Database Systems”, Pearson Education, 6th Edition, 2013.
3.Reema Thareja, “Python Programming - Using Problem Solving Approach”, Oxford Press, 1st Edition, 2017.
4. Larry Lutz, “Python for Beginners: Step-By-Step Guide to Learning Python Programming”, CreateSpace Independent Publishing Platform, First edition, 2018

Online Learning Resources/Virtual Labs:

1. http://vlabs.iitkgp.ernet.in/se/
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php
3. https://python-iitk.vlabs.ac.in

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Course Code		L	T	P	C
20A49901	Design Thinking for Innovation	2	1	0	0

Pre-requisite **Semester -IV**

Course Objectives:

The objectives of this course are:

	The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1	Define the concepts related to design thinking.
2	Explain the fundamentals of Design Thinking and innovation
3	Apply the design thinking techniques for solving problems in various sectors.
4	Analyse to work in a multidisciplinary environment
5	Evaluate the value of creativity

UNIT – I

Introduction to Design Thinking Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT - II
Design Thinking Process
Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brain storming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT - III

Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT - IV

Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT - V

Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, About maintenance, Relibility and plan for startup.

Textbooks:

1.Change by design, Tim Brown, Harper Bollins (2009)

2. Design Thinking for Strategic Innovation, Idris Mootee, 2013, John Wiley & Sons.

Reference Books:

1. Design Thinking in the Classroom by David Lee, Ulysses press

2. Design the Future, by Shrrutin N Shetty, Norton Press

3. Universal principles of design- William Lidwell, Kritinaholden, Jill Butter.

4. The era of open innovation – Chesbrough.H

Online Learning Resources:

https://nptel.ac.in/courses/110/106/110106124/

https://nptel.ac.in/courses/109/104/109104109/

https://swayam.gov.in/nd1_noc19_mg60/preview

Course Code	Design of Reinforced Concrete Structures	L	T	P	C
20A50101		3	0	0	3
	Semester	V			

Course Objectives:

1. To teach the students about the design of reinforced concrete beam, column, slab, footing and retaining wall.
2. To enable the students to understand the various design philosophies based on both working stress and limit state methods.
3. To enhance competence in design of reinforced concrete structures.
4. To understand the concepts of designing reinforced cement concrete structures.
5. To familiarize the students with the concepts of designing concrete mixes using different methods of proportioning and to understand the effects of various parameters

Course Outcomes (CO):

1	Classify the basic concepts of reinforced concrete analysis and design.
2	Classify the behaviour and various modes of failure of reinforced concrete members.
3	Design of Short and Long columns
4	Design of different types of footings
5	Design of slabs and staircase.

UNIT - I **Introduction**

Concepts of Reinforced concrete Design – Introduction to Working Stress Method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS – 456:2000.

Beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections

UNIT - II **Shear and Torsion**

Limit state analysis and design of section for shear and torsion – Concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing;

UNIT - III **Columns**

Short and Long columns – Under axial loads, Uniaxial bending and biaxial bending – I S Code provisions.

UNIT - IV **Footings**

Different types of footings – Design of isolated, square, rectangular, circular footings

UNIT - V **Slabs & Stair Case**

Design of one way slab, Two-way slabs and continuous slab using I.S. Coefficients, Limit state design for serviceability for deflection, cracking and IS code provision. Design of doglegged staircase.

Codes/Tables: IS 456-2000 and relevant sheets (Pertaining to columns) of SP 16 Code books to be permitted into the examinations Hall.

Exam Pattern :
The end examination paper should consist of Part A and Part B. Part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B shouldconsist of five questions on design out of which three are to be answered. Weightage forPart - A is 40% and Part- B is 60%.

Textbooks:

1. Limit state designed of reinforced concrete by P. C. Varghese, Prentice Hall of India, NewDelhi
2. Structural Design and Drawing: Reinforced Concrete and Steel, Fourth Edition, N Krishna Raju, Universities Press, 2022

Reference Books:

1. Limit State Design of Reinforced Concrete by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, , Laxmi, Publications Pvt. Ltd., New Delhi
2. Fundamentals of reinforced concrete by N. C. Sinha and S. K Roy, S. Chand publishers
3. Design of Reinforced concrete structures by N.Subramanian, Oxford university press.
4. IS 456- 2000 Code of practice for Reinforced Concrete Structures.

Online Learning Resources:
https://nptel.ac.in/courses/105105105

Course Code	Water Resource Engineering	L	T	P	C
20A50102		3	0	0	3
	Semester	V			

Course Objectives:

1. To introduce the phenomena of hydrology, different parts involved in hydrologic cycle.
2. To know diverse methods of collecting the hydrological informationand know the basic principlesand movement of ground water.
3. To know the necessity and importance of irrigation and other key elements like Duty, delta , water requirements of crops etc.,
4. To introduce the various silt theories associated with irrigation channels and ill effects of water logging and their preventive measures like canal lining and their design
5. To introduce various types of cross drainage works and their floor design by Bligh and Khoslas theory.

Course Outcomes (CO):

1	Understand the various processes of hydrologic cycle, measurement of rainfall and analyze the rainfall data.
2	Estimate the rainfall data from hydrograph analysis and classify the geological formation of ground water
3	Understand the process of irrigation and water requirement of crops
4	Understand various aspects related to Canal-silt theories, water logging and design of canal lining.
5	Understand the different types of cross drainage work

.

UNIT - I

INTRODUCTION TO HYDROLOGY: Engineering hydrology and its applications; Hydrologic cycle; precipitation- Types and forms, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, presentation and interpretation of rainfall data.

DESCRIPTIVE HYDROLOGY:Evaporation- Factors affecting evaporation, measurement of evaporation; Infiltration- Factors affecting infiltration, measurement of infiltration, infiltration indices; Run off- Factors affecting run- off, Computation of run-off; Design Flood; Estimation of maximum rate of run-off; separation of base flow.

UNIT - II

HYDROGRAPH ANALYSIS: Hydrograph; Unit Hydrograph- Construction and limitations of Unit hydrograph, Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; S-hydrograph.

GROUND WATER: Introduction; Aquifer; Aquiclude; Aquifuge; aquifer parameters-porosity, Specific yield, Specific retention; Divisions of sub–surface water; Water table; Types of aquifers; storage coefficient-coefficient of permeability and transmissibility

UNIT - III

IRRIGATION: Introduction; Necessity and Importance of Irrigation; advantages and ill effects of Irrigation; types of Irrigation; methods of application of Irrigation water; quality for Irrigation water. Duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty.

WATER REQUIREMENT OF CROPS: Types of soils, Indian agricultural soils, preparation of land for Irrigation; soil fertility; Soil-water-plant relationship; vertical distribution of soil moisture; soil moisture tension; soil moisture stress; various soil moisture constants; Limiting soil moisture conditions; Depth and frequency of irrigation; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; Kor depth and Kor period; crop seasons and crop rotation; Irrigation efficiencies; Determination of irrigation requirements of crops; Assessment of Irrigation water. Consumptive use of water-factors affecting consumptive use, direct measurement and determination by use of equations (theory only)

UNIT - IV

CHANNELS – SILT THEORIES: Classification; Canal alignment; Inundation canals; Cross–section of an irrigation channel; Balancing depth; Borrow pit; Spoil bank; Land width; Silt theories–Kennedy's theory, Kennedy's method of channel design; Drawbacks in Kennedy's theory; Lacey's regime theory- Lacey's theory applied to channel design; Defects in Lacey's theory; Comparison of Kennedy's and Lacey's theory.

WATER LOGGING AND CANAL LINING: Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – Necessity, advantages and disadvantages; Types of lining; Design of lined canal.

UNIT - V

DIVERSION HEAD WORKS: Types of diversion head works; Diversion and Storage head works; weirs and barrages; Layouts of diversion head works; components; Causes and failure of hydraulic structures on permeable foundations; Blighs creep theory; Khoslas theory; Determination of uplift pressure, impervious floors using Blighs and Khoslas theory; Exit gradient.

Textbooks:

1. Irrigation and water power engineering by Punmia&Lal, Laxmi publications pvt. Ltd., New Delhi 17th edition 2021
2. Engineering Hydrology by K. Subramanya, The Tata Mcgraw Hill Company, Delhi 5th edition 2020

Reference Books:

1. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi 36th edition
2. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi 3rd edition 2016
3. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House 6th edition 2020

Online Learning Resources:

https://nptel.ac.in/courses/105101214

Course Code	Geotechnical Engineering - I	L	T	P	C
20A50103		3	0	0	3
	Semester	V			

Course Objectives:

1. To enable the student to find out the index properties of the soils and their classification.
2. To enable the student to determine permeability of soils using various methods , and to understand the concept of seepage of water through soil
3. To enable the students to estimate the stresses due to applied loads
4. To enable the students to understand the difference between compaction and consolidation.
5. To impart knowledge on shear strength and its importance

Course Outcomes (CO):

1. Understand soil formation and determine the index properties of soil
2. Determine the permeability and seepage of soils for fluid flow characteristics analysis
3. estimate the stresses under any system of foundation loads
4. Analyze the compressibility of the soils
5. Determine the shear strength of soil

UNIT - I

INTRODUCTION: Soil formation – Soil structure – Adsorbed water – Mass- Volume relationship – Relative density. Index Properties Of Soils: Moisture Content, Specific Gravity, In-situ density, Grain size analysis – Sieve and Hydrometer methods – Consistency limits and indices – I.S. Classification of soils.

UNIT - II

PERMEABILITY: Soil water – Capillary rise – flow of water through soils – Darcy's law-permeability – Factors affecting – Laboratory determination of coefficient of permeability – Permeability of layered systems.

SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –Quick sand condition – Seepage through soils – Flow nets : Characteristics and Uses.

UNIT - III

STRESS DISTRIBUTION IN SOILS: Boussinesq's and Wester guard's theories for point loads and areas of different shapes – Newmark's influence chart .

Compaction: Mechanism of compaction – Factors affecting – effects of compaction on soil properties. – Field compaction Equipment – Compaction control.

UNIT - IV

CONSOLIDATION : Types of compressibility – Primary consolidation and secondary consolidation - Stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil and under consolidated soil – pre-consolidation pressure and its determination – Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods.

UNIT - V

SHEAR STRENGTH OF SOILS : Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – Critical void ratio –Liquefaction.

Textbooks:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors Delhi 7th edition 2009

2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

Reference Books:

1. Soil Mechanics and Foundation by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi 17th edition 2017
2. Geotechnical Engineering by Iqbal H.Khan, PHI pubilishers 4th edition.
3. Basic and Applied Soil Mechanics by Gopal Ranjan& ASR Rao, New age International Pvt . Ltd, New Delhi 3rd edition 2016

Online Learning Resources:

https://nptel.ac.in/courses/105101201
https://nptel.ac.in/courses/105105185

Course Code	Advanced Structural Analysis	L	T	P	C
20A50104a		3	0	0	3
	Semester	V			

Course Objectives:

1. Ability the behavior of arches and their methods of analysis
2. To ability various classical methods for analysis of indeterminate structures
3. Ability to analyze the beam and frames for vertical and horizontal loads and draw SFD and BMD
4. To ability the effect of support settlements for indeterminate structures. Able to calculate forces in members of truss due to load by stiffness method
5. Ability to analyze and perform plastic analysis on various structural elements

Course Outcomes (CO):

1	Demonstrate the behaviour of arches and their methods of analysis
2	Analyze the frames by moment distribution method and substitute frame analysis
3	Analyze the beams and frames using Kani's method
4	Analyze the beams and frames by using Flexibility Matrix method
5	Analyze the beams and frames by using Stiffness Matrix method

UNIT - I

ARCHES : Three hinged and Two hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature-Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses.

UNIT - II

MOMENT DISTRIBUTION METHOD FOR FRAMES:-Analysis of single bay single storey portal frame including side sway –Substitute frame analysis by two cycle method.

UNIT - III

KANI`S METHOD:-

Analysis of continuous beams with and without settlement of supports -Single bay single storey portal frames with and without side sway.

UNIT - IV

FLEXIBILITY METHOD :-

Flexibility methods- Introduction- Application to continuous beams including support settlements Analysis of Single bay single storey portal frames without and with side sway

UNIT – V

STIFFNESS METHOD:

Stiffness methods- Introduction-application to continuous beams including support settlements- Analysis of Single bay single storey portal frames without and with side sway.

Textbooks:

1. Analysis of structures by Vazrani&Ratwani – Khanna Publications.
2. Theory of structures by Ramamuratam, jain book depot , New Delhi.

Reference Books:

1. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.
2. Basic Structural Analysis by K.U.Muthu*et al.*,I.K.International Publishing

House Pvt.Ltd
3. Theory of Structures by Gupta S P, G S Pundit and R Gupta, Vol II, Tata McGrawHill Publications company Ltd.
4. D S Prakash Rao, **"Structural Analysis: A Unified Approach"**, Universities PressOnline Learning Resources:

Course Code	**Sub Surface Investigation and Instrumentation**	**L**	**T**	**P**	**C**
20A50104b		**3**	**0**	**0**	**3**
	Semester		**V**		

Course Objectives:
1. To discuss the importance of site investigation
2. To narrate various exploration techniques
3. To describe soil sampling techniques
4. To train with in-situ sub soil exploration methods
5. To demonstrate instrumentation for sub soil exploration

Course Outcomes (CO):
1. Plan and execute sub soil investigation programme.
2. Handle both laboratory and in-situ testing techniques
3. Carry out collection, handling and preservation of samples
4. Handle instruments during sub soil exploration process
5. Understand the usage of instrumentation in subsurface investigation

UNIT - I

Exploration and geophysical methods:

Exploration program planning -Methods of exploration- Preliminary and detailed design- spacing and depth of bores, data presentation. Geophysical exploration and interpretation, seismic and electrical methods, cross bore hole, single bore hole – Up hole -Down hole methods.

UNIT - II

Exploration Techniques

Methods of boring and drilling, non-displacement and displacement methods, drilling in difficult subsoil conditions, limitations of various drilling techniques, stabilization of boreholes, bore logs.

UNIT - III

Soil Sampling

Sampling Techniques – Quality of samples – Factors influencing sample quality - Disturbed and undisturbed soil sampling advanced sampling techniques, offshore sampling, shallow penetration samplers, preservation and handling of samples.

UNIT - IV

Field Testing In Soil Exploration

Field tests, penetration tests, Field vane shear, Insitu shear and bore hole shear test, pressure meter test, dilatometer test - Plate load test–Monotonic and cyclic; field permeability tests – Block vibration test. Procedure, limitations, Correction and data interpretation.

UNIT - V

Instrumentation

Instrumentation in soil engineering, strain gauges, resistance and inductance type, load cells, earth pressure cells, settlement and heave gauges, pore pressure measurements - Slope indicators, sensing units, case studies.

Textbooks:

1. Alam Singh and Chowdhary G. R., "Soil Engineering in Theory and Practice, Volume-2, Geotechnical testing and instrumentation", CBS Publishers and Distributors, New Delhi, 2006.
2. Dunnicliff J., and Green, G. E., "Geotechnical Instrumentation for Monitoring Field Performance", John Wiley, 1993.

Reference Books:

1. Bowles J. E., "Foundation Analysis and Design", 5th Edition, The McGraw-Hill companies, Inc., New York, 1995.
2. C. Venkataramiah, "Geotechnical Engineering", New age International Pvt . Ltd, (2002).
3. Hanna T. H., "Field Instrumentation in Geotechnical Engineering", Trans Tech., 1985.
4. Hunt R. E., "Geotechnical Engineering Investigation Manual", McGraw Hill, 1984.

Online Learning Resources:

Course Code	Remote Sensing and GIS	L	T	P	C
20A50104c		3	0	0	3
	Semester	V			

Course Objectives:

1. Apply the concepts of Photogrammetry and its applications such as determination of heights of objects on terrain .
2. Understand the basic concept of Remote Sensing and know about different types of satellite and sensors.
3. Illustrate Energy interactions with atmosphere and with earth surface features, Interpretation of satellite and top sheet maps
4. Understand different components of GIS and Learning about map projection and coordinate system
5. Develop knowledge on conversion of data from analogue to digital and working with GIS software.

Course Outcomes (CO):

1. Comparing with ground, air and satellite based sensor platforms.
2. Interpret the aerial photographs and satellite imageries.
3. Create and input spatial data for GIS application.
4. Apply RS and GIS concepts in water resources engineering.
5. Applications of various satellite data.

UNIT - I

Introduction to photogrammetry : Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT - II

Remote sensing :Basic concepts and foundation of remote sensing – Elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT - III

Geographic information system :Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT - IV

GIS spatial analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT - V

Water resources applications : Land use/Land cover in water resources, Surface water

mapping and inventory -Watershed management for sustainable development and Watershed characteristics - Reservoir sedimentation, Fluvial Geomorphology - Ground Water Targeting, Identification of sites for artificial Recharge structures - Inland water quality survey and management, water depth estimation and bathymetry.

Textbooks:

1. Remote Sensing and GIS by B. Bhatta, Oxford University Press, New Delhi 3rd edition 2021
2. Remote Sensing and its applications by L. R. A. Narayana, University Press 1999.

Reference Books:

1. Fundamentals of remote sensing, by George Joseph, Universities press, Hyderabad 3rd edition 2018
2. Advanced surveying: Total station GIS and remote sensing, by SatheeshGopi, Pearson publication 2nd edition 2017
3. Concepts & Techniques of GIS, by C. P. Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
4. Remote sensing and GIS, by M. Anji Reddy B. S. Publications, New Delhi.

Online Learning Resources:

https://nptel.ac.in/courses/105103193

(Common to All Branches)

Open Elective Course-I

Course Code	**Experimental Stress Analysis**	**L**	**T**	**P**	**C**
20A50105		**3**	**0**	**0**	**3**

Semester V

Course Objectives:

1. To understand different methods of experimental stress analysis
2. To understand the use of strain gauges for measurement of strain
3. To be exposed to different Non destructive methods of concrete
4. To understand the theory of photo elasticity and its applications in analysis of structures
5. To understand different methods of photo elasticity

Course Outcomes (CO):

1. Understand different methods of experimental stress analysis
2. Understand the use of strain gauges for measurement of strain
3. Expose to different Non destructive methods of concrete
4. Understand the theory of photo elasticity and its applications in analysis of structures
5. Understand different methods of photo elasticity

UNIT - I

PRINCIPLES OF EXPERIMENTAL APPROACH:Merits of Experimental Analysis Introduction, uses of experimental stress analysisAdvantages of experimental stress analysis, Different methods –Simplification of problems.

UNIT - II

STRAIN MEASUREMENT USING STRAIN GAUGES :Definition of strain and its relation of experimental Determinations Properties of Strain-

Gauge Systems-Types of Strain Gauges –Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – Various types –Gauge factor – Materials of adhesion base.

UNIT - III

STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE: Introduction – The three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge.

Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.

UNIT - IV

THEORY OF PHOTOELASTICITY: Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polar scope for various arrangements – Fringe Sharpening. Brewster's Stress Optic law.

UNIT - V

TWO DIMENSIONAL PHOTOELASTICITY:Introduction – Isochramic Fringe patterns-Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

Textbooks:

1. Experimental stress analysis by J.W.Dally and W.F.Riley, College House Enterprises2005
2. Experimental stress analysis by Dr.SadhuSingh.khanna Publishers 4th edition

Reference Books:

1. Experimental Stress analysis by U.C.Jindal, Pearson Pubilications 2012 edition
2. Experimental Stress Analysis by L.S.Srinath, MC.Graw Hill Company Publishers.

Online Learning Resources:
https://nptel.ac.in/courses/112106068

Course Code	Computer Aided Drafting lab – I	L	T	P	C
20A50106		0	0	3	1.5
	Semester	V			

Course Objectives:

1. Introduce AutoCAD software as a drafting tool for civil engineering student.
2. Use AutoCAD software for detailing and drawing of bonds in masonry doors, windows and ventilators.
3. Teach drawing of line diagrams, plans, elevations & sections for residential buildings using AutoCAD software
4. Teach drawing of line diagrams, plans, elevations & sections for multi-storey residential buildings using AutoCAD software
5. Creating 3D solid models into 2D drawing-different views, sections

List of Experiments:

1. Introduction to computer aided drafting
2. Practice exercises on CAD software
3. Detailing & Drawing of English Bond using CAD Software
4. Detailing & Drawing of Flemish Bond using CAD Software
5. Detailing & Drawing of Doors using CAD Software
6. Detailing & Drawing of Windows using CAD Software
7. Detailing & Drawing of Ventilators &Roofsusing CAD Software
8. Detailing of Building Components using CAD Software.
9. Drawing of Line diagram of Residential Building Using CAD software.
10. Drawing of Plan, Section & Elevation for Residential Buildings Using CAD Software.
11. Drawing Line diagram for Multi Storey Residential Buildings.
12. Drawing of Plan, Section & Elevation for Residential Multi Storey Buildings Using CAD Software.

Course Outcomes (CO):

1. To understand features of AutoCAD software as a drafting tool.
2. To draw and detail masonry doors, windows and ventilators.
3. To draw line diagrams, plans, elevations & sections for residential buildings using AutoCAD software
4. To draw line diagrams, plans, elevations & sections for multi-storey residential buildings using AutoCAD software.
5. Able to convert2D drawings into 3D models for residential buildings

Course Code	Geotechnical Engineering Lab - I	L	T	P	C
20A50107		0	0	3	1.5
	Semester	V			

Course Objectives:

1. To enable the students to know the various index properties of soils
2. To carry out laboratory tests and to identify soils as per BIS
3. To obtain the relationship between moisture content and dry density by conducting compaction test
4. To perform the shear tests and estimate the shear strength of soil
5. To estimate the seepage properties of soil

Course Outcomes (CO)

At the end of the course, the student will be able to:

1. Able to identify various soils based on their index properties of soils
2. Able to classify the soil based on their grain size and plasticity properties of soil
3. Estimate the OMC and MDD of soil
4. Able to determine permeability and CBR values of soil
5. Estimate the shear strength of soil.

List of Experiments:

1. Specific gravity
2. Grain size analysis by sieving
3. Field density-Core cutter and Sand replacement methods
4. Atterberg's Limits.
5. Proctor Compaction test
6. Permeability of soil - Constant and Variable head tests
7. CBR Test
8. Direct Shear test
9. Differential Free Swell Index
10. Laboratory one-point liquid limit test

Textbooks

1. Soil Mechanics and Foundation Engg by K. R. Arora, Standard Publishers and Distributors, Delhi 7th edition 2009.
2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt .Ltd, (2002).

References:

1. Soil Mechanics and Foundation by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi publications Pvt. Ltd., New Delhi 17th edition 2017.
2. Basic and Applied Soil Mechanics by GopalRanjan& A. S. R. Rao, New age International Pvt . Ltd, New Delhi 3rd edition 2016.
3. Principles of Geotechnical Engineering by Braja M. Das Cengage Learning

Course Code	ESTIMATION, COSTING AND VALUATION	L	T	P	C
20A50108		1	0	2	2
	Semester	V			

Course Objectives:

1. To impart basic knowledge on different types of estimation
2. To enrich with specifications and tender procedures.
3. To give insights on various types of contract agreements.
4. To prepare detailed estimates
5. To inculcate data preparation for abstract estimation
6. To teach procedure for valuation of buildings.

Course Outcomes (CO):

1. Understand basics on methods and types of estimation.
2. Formulate specifications and write tender documents.
3. Prepare contract agreements
4. Determine rate analysis of different items.
5. Understand the Valuation of buildings.

LIST OF EXPERIMENTS

1. Activity based learning on methods and types of estimates
2. Preparation of Detailed estimate for a single storey residential building using wall to wall method
3. Preparation of Detailed estimate for a single storey residential building using centre line method for Earthwork, foundations, Super structure, Fittings including sanitary and electrical fittings & Paintings.
4. Preparation of Detailed estimate for a two storey residential building using centre line method for Earthwork, foundations, Super structure, Fittings including sanitary and electrical fittings & Paintings.
5. Activity based learning of Estimate Data and Rate Analysis
6. Preparation of Abstract Estimate for the detailed estimate in Exercise No.3
7. Preparation of Abstract Estimate for the detailed estimate in Exercise No.4
8. Writing of Measurement book and Bill preparation as per AP State Govt Procedure for detailed estimate in No. 3 and abstract estimate of No. 6
9. Writing of detailed specifications for various items of estimate and preparing a model Tender document for the work Listed in No. 3 and 6
10. Activity based learning for Valuation of Buildings, Cost escalation procedures and Value Analysis for any one work

Textbooks:

1. Estimating and Costing in Civil Engineering (Theory & Practice) by Dutta, B. N., UBS Publishers, 28th edition 2021
2. Civil Engineering Contracts and Estimates", by B. S. Patil, Universities Press Pvt Ltd, Hyderabad. 4th Edition 2015.

Reference Books:

1. Estimation, Costing and Specifications by M. Chakraborthi, Laxmi publications 24th edition
2. Standard Schedule of rates and standard data book by public works department.
3. I. S. 1200 (Parts I to XXV, "Method of Measurement of Building and Civil Engineering works – B.I.S.)" 1974

Online Learning Resources:

https://onlinecourses.swayam2.ac.in/nou20_cs11/preview

JNTUA COLLEGE OF ENGINEERING
(AUTONOMOUS)ANANTAPUR
CONSTITUTION OF INDIA
(Common to CE, MECH, CHEM)

Subject Code	Title of the Subject	L	T	P	C
20A59101	**INDIAN CONSTITUTION**	2	0	0	0

COURSE OBJECTIVES : The objective of this course is	
1	To Enable the student to understand the importance of constitution
2	To understand the structure of executive, legislature and judiciary
3	To understand philosophy of fundamental rights and duties
4	To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
5	To understand the central-state relation in financial and administrative control

Syllabus

UNIT-IIntroduction to Indian Constitution

Constitution -Meaning of the term - Indian Constitution- Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History and features of Indian constitution
- Learn about Preamble, Fundamental Rights and Duties

UNIT-II Union Government and its Administration

Structure of the Indian Union - Federalism - Centre-State relationship – President's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the structure of Indian government

- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III State Government and its Administration

Structure of the State Govt. - Governor - Role and Position -CM and Council of Ministers - State Secretariat- Organization Structure and Functions

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the structure of state government
- Analyze the role of Governor and Chief Minister
- Explain the role of State Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV Local Administration

District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Panchayati Raj - Functions– PRI – Zilla Parishath - Elected officials and their roles – CEO, ,Zilla Parishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration's role and importance
- Analyze the role of Mayor and elected representatives of Municipalities
- Learn about the role of Zilla Parishath block level organization

UNIT-V Election Commission

Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women

LEARNING OUTCOMES: -After completion of this unit student will

- Know the role of Election Commission
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze the role of state election commission
- Evaluate various commissions viz SC/ST/OBC and women

TEXT BOOKS

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust

REFERENCES:

1. J.A. Siwach, Dynamics of Indian Government & Politics,
2. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
3. .J.C. Johari, Indian Government and Politics, Hans India
4. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

E-RESOURCES:

1.nptel.ac.in/courses/109104074/8
2.nptel.ac.in/courses/109104045/
3.nptel.ac.in/courses/101104065/
4.www.hss.iitb.ac.in/en/lecture-details
5.www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

COURSE OUTCOMES: At the end of the course, students will be able to	
CO1	State the historical background of the constitution making and its importance for building a democratic India.
CO2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO3	Demonstrate the value of the fundamental rights and duties for becoming good citizen of India.
CO4	Analyze the decentralization of power between central, state and local self-government
CO5	Appraise the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
CO6	Develop themselves as responsible citizens and pave way to build a democratic country.

Course Code	Design of Steel Structures	L	T	P	C
20A60101		3	0	0	3
	Semester	VI			

Course Objectives:

1. To introduce steel structures and its basic components
2. To introduce structural steel fasteners like welding and bolting
3. To teach design tension members, compression members, beams and beam-columns
4. To teach design column splices and bases
5. To teach design of various steel structures.

Course Outcomes (CO):

1. Understand the basic concepts of Steel structures and design of Tension members
2. Analyze and Design of compression members
3. Analyze and design of beams
4. Analyze and design of simple roof truss .
5. Analyze and design of Plate girder

UNIT - I

Concepts of Plasticity, Yield strength of steel, Section Classification. Loads and combinations, wind loads on roof trusses., Concept of limit State Design of steel structures – Different Limit States as per IS 800 -2007 – Design Strengths- Deflection limits – Serviceability - Bolted connections – Welded connections – Design Strength – Efficiency of joint – Prying action Types of Welded joints - Design of Tension members

UNIT - II

Design of Steel Compression members – Buckling class – slenderness ratio / strength design – Laced – Battened columns – Design of Column bases – Slab base only.

UNIT - III

Design of Beams – Plastic moment – Bending and shear strength, design of laterally supported beams – Built up sections – Large plates Web buckling, Crippling and Deflection of beams

UNIT - IV

Design of eccentric connections with brackets, Beam end connections – Web angle – Un-stiffened and stiffened seated connections (bolted and Welded types) Design of truss joints

UNIT - V

Plate Girder: Design consideration – I S Code recommendations - Design of welded plate girder – Curtailment of flange plates- stiffeners.

Textbooks:

1. Limit state design of Steel Structures by Subramanyam.N, Oxford University press, New Delhi 2nd edition 2018
2. Limit State Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi

3rd edition 2019

Reference Books:

1. Structural Design and Drawing by N.KrishnaRaju, University Press, Hyderabad 3rd edition 2009
2. Structural design in steel by SarwarAlamRaz, New Age International Publishers, New Delhi
3. Design of Steel Structures by Edwin Gaylord,CharlesGaylord,JamesStallmeyer, Tata Mc.Graw-Hill, New Delhi.

Online Learning Resources:

Course Code	Highway Engineering	L	T	P	C
20A60102		3	0	0	3
	Semester	VI			

Course Objectives:

1. To make the student understand the importance of Highway Development in Social and Economic Development of a Nation
2. To impart the concepts of Geometric Design of various Highway Infrastructure elements like Superelevation, Sight Distances, Radius of Curve, Extra widening etc
3. To make the student aware of Basic Traffic Parameters and Surveys needed for Collecting Data about them
4. To make the student understand the need for Management of Traffic in Urban areas and the measures available
5. To familiarize the students with types of Road Intersections and their design elements

Course Outcomes (CO):

1. Understand the importance of Highway Development in Social and Economic Development of a Nation
2. Understand the concepts of Geometric Design of various Highway Infrastructure elements like Superelevation, Sight Distances, Radius of Curve, Extra widening etc
3. Undestand of Basic Traffic Parameters and Surveys needed for Collecting Data about them
4. Understand the need for Management of Traffic in Urban areas and the measures available
5. Familiar with types of Road Intersections and their design elements

UNIT - I

Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT - II

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT - III

TRAFFIC ENGINEERING STUDIES

Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation – Highway capacity and level of service concept – factors affecting capacity and level of service - Traffic Volume Studies- Data Collection and Presentation-Speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents- Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams. Design of Traffic Signals – Webster Method.

UNIT - IV

Conflicts at Intersections- Channelization: Objectives –Traffic Islands and Design criteria- Types of At-Grade Intersections – Types of Grade Separated Intersections- Rotary

Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT - V

Types of pavements – Difference between flexible and rigid pavements – Pavement Components – Sub grade, Sub base, base and wearing course – Functions of pavement components – Design Factors – Flexible pavement Design methods – G.I method, CBR Method, (as per IRC 37-2002) –Design of Rigid pavements – Critical load positions - Westergaard's stress equations – computing Radius of Relative stiffness and equivalent radius of resisting section – stresses in rigid pavements – Design of Expansion and contraction joints in CC pavements. Design of Dowel bars and Tie bars.

Textbooks:

1. Highway Engineering – S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 7th edition (2000).
2. Transportation Engineering, Volume I, C Venkatramaiah, Universities Press, 2015

Reference Books:

1. Principles of Highway Engineering by L.R.Kadiyali, Khanna Publishers
2. Traffic Engineering and Transportation Planning by L.R.Kadiyali and Lal- Khanna Publications 9th edition
3. Highway Engineering – Dr.S.K.Sharma, S.Chand Publishers 2014 edition
4. Transportation Engineering, R Srinivas Kumar, Universities Press, 2020
5. Pavement Design, R Srinivasa Kumar, Universities Press, 2013

Online Learning Resources:

https://nptel.ac.in/courses/105105107
https://nptel.ac.in/courses/105107123

Course Code	Geotechnical Engineering - II	L	T	P	C
20A60103		3	0	0	3
	Semester	VI			

Course Objectives:

1. To enable the student to carry out the soil exploration program.
2. To enable the student to determine the earth slope stability.
3. To enable the student to estimate lateral earth pressure using various theories.
4. To enable the student to select a particular type of foundation and its bearing capacity
5. To enable the student to analyze the load carrying capacity of pile foundation and Selection of a shape of well foundation

Course Outcomes (CO):

1. Understand different soil exploration techniques.
2. Analyze the earth slope stability.
3. Estimate earth pressure using various theories.
4. Estimate the allowable bearing pressure and Choice of selection of a foundation.
5. Analyze the load carrying capacity of pile foundation and understand the components of well foundation.

UNIT - I

SOIL EXPLORATION: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – Planning of Programme and preparation of soil investigation report.

UNIT - II

EARTH SLOPE STABILITY: Infinite and finite earth slopes – Types of failures – Factor of safety of infinite slopes – Stability analysis by Swedish arc method, standard method of slices, Friction Circle method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

UNIT - III

EARTH PRESSURE THEORIES: Rankine's theory of earth pressure – Earth pressures in layered soils – Coulomb's earth pressure theory – Rebhann's and Cullman's graphical method

RETAINING WALLS: Types of retaining walls – stability of retaining walls.

UNIT - IV

SHALLOW FOUNDATIONS: Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff's and Skempton`s Methods

ALLOWABLE BEARING PRESSURE: Safe bearing pressure based on N- value – Allowable bearing pressure; safe bearing capacity and settlement from plate load test – Allowable settlements of structures – Estimation of Consolidation of settlement.

UNIT - V

PILE FOUNDATION: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

WELL FOUNDATIONS: Types – Different shapes of wells – Components of wells – functions and Forces on well foundation – Sinking of wells – Tilts and shifts.

Textbooks:

1. Geotechnical Engineering by C.Venkataramaiah, New Age Pubilications(2002).
2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi 7th edition 2009
3. Soil Mechanics and Foundations by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi publications Pvt. Ltd., New Delhi 17th edition 2017

Reference Books:

1. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications 2nd edition 2013
2. Principles of Foundation Engineering by Das, B.M., - (1999)–6th edition (Indian edition) Thomson Engineering
3. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
4. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
5. Foundation Analysis and Design by Bowles, J.E., (1988)– 4th Edition, McGraw-Hill Publishing company, Newyork.
6. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

Online Learning Resources:

https://nptel.ac.in/courses/112106068

Course Code	Prestressed Concrete	L	T	P	C
20A60104a		3	0	0	3
	Semester	VI			

Course Objectives:

1. Understand the principles & necessity of prestressed concrete structures
2. Get the knowledge on various losses of prestress.
3. Analyse PSC beams with straight, concentric, eccentric, bent and parabolic tendons and design beams of rectangular and I section for flexure.
4. Design shear reinforcements, structural elements for shear, torsion and anchorage as per the provisions of BIS.
5. Interpret the transmission mechanism of pre-stressing force by bond and compute deflection of beams under loads

Course Outcomes (CO):

1. Understand the concepts of pre-stressing and methods of pre stressing.
2. Compute losses of pre-stress in pre-stressed concrete members.
3. Design PSC beams under flexure and shear.
4. Estimate the short- and long-term deflections of PSC beams.
5. Apply prestressing concepts for composite beams.

UNIT - I Introduction

Principles of pre-stressing – Pre stressing systems - Pre-tensioning and post tensioning- Advantages and limitations of Pre stressed concrete- Need for high strength materials. Methods of pre-stressing: Pre-tensioning (Hoyer system) and Post-tensioning methods (Freyssinet system and Gifford- Udall System).

UNIT - II Losses of pre-stress

Loss of pre-stress in pre-tensioned and post-tensioned members due to elastic shortening, shrinkage and creep of concrete, relaxation of stress in steel, anchorage slip and frictional losses.

UNIT - III Flexure and shear

Analysis of beams for flexure and shear - Beams pre-stressed with straight, concentric, eccentric, bent and parabolic tendons- Kern line - Cable profile - Design of PSC beams (rectangular and I sections) using IS 1343. Analysis and design of rectangular and I beams for shear. Introduction to Transmission length and End block (no Design and Analytical problems).

UNIT - IV Deflections

Control of deflections- Factors influencing deflections - Short term deflections of uncracked beams- Prediction of long time deflections.

UNIT - V Composite beams

Different Types- Propped and Un-propped- stress distribution- Differential shrinkage- Analysis of composite beams.

Textbooks:

1. Prestressed Concrete by N. Krishna Raju, Tata Mc.Graw Hill Publications 6th edition 2018
2. Prestressed concrete by N.RajagopalanNarosa Publishing House 2nd edition 2017

Reference Books:

1. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns, John Wiley & Sons 3rd edition 2010
2. Prestressed Concrete Design by Praveen Nagrajan, Pearson publications, 2013.
3. Prestressed Concrete by Ramamrutham, Dhanpatrai Publications 2020 edition
4. BIS code on “prestressed concrete”, IS: 1343 to be permitted into the examination Hall.

Online Learning Resources:

https://nptel.ac.in/courses/105106118

Course Code	Green Buildings	L	T	P	C
20A60104b		3	0	0	3
	Semester	VI			

Course Objectives:

1. Exposure to the green building technologies and their significance
2. Understand the judicial use of energy and its management
3. Educate about the Sun-earth relationship and its effect on climate
4. Enhance awareness of end-use energy requirements in the society.
5. Develop suitable technologies for energy management

Course Outcomes (CO):

1. Understand the fundamentals of energy use and energy processes in building
2. Identify the energy requirement and its management
3. Know the Sun-earth relationship vis-a-vis its effect on climate
4. Be acquainted with the end-use energy requirements.
5. Be familiar with the audit procedures of energy

UNIT - I

Introduction to Green Building – Necessity of Green Building- Benefits of Green Buildings, - Green Building Materials and Equipment in India, - key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

UNIT - II

Green Building Concepts And Practices Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities And Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency.

UNIT - III

Green Building Design Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximize System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement.

UNIT - IV

Air Conditioning Introduction,CII Godrej Green business centre, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection, pump selection, Selection of cooling towers, Selection of air handing units,Precooling of fresh air, Interior lighting system, Key feature of the building. Eco-friendly captive power generation for factory, Building requirement

UNIT - V

Material Conservation Handling of non process waste, waste reduction during construction, materials with recycled content, local materials, material reuse, certified wood ,Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke

control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels

Textbooks:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.
2. Green Building Hand Book by Tomwoolley and Samkimings, 2009

Reference Books:

1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009
3. Energy Conservation Building Code –ECBC-2020, published by BEE

Online Learning Resources:

Course Code	Industrial Waste and WasteWater Management	L	T	P	C
20A60104c		3	0	0	3
	Semester	VI			

Course Objectives:

1. Wastewater quantity generation.
2. To Know the industrial process, water utilization and waste water generation.
3. To Impart knowledge on selection of treatment methods for industrial wastewater.
4. To acquire the knowledge on operational problems of common effluent treatment plants.
5. To gain knowledge on different techniques and approaches for minimizing the generation and application of Physio-chemical and biological treatment methods for recovery, reuse and disposal of industrial wastewater.

Course Outcomes (CO):

1. understand the fundamental concepts of waste water treatment.
2. Understand the industrial process, water utilization and waste water generation .
3. Acquire the knowledge on operational problems of common effluent treatment plants.
4. Impart knowledge on selection of treatment methods for industrial wastewater.
5. Understand the modern techniques skills and tools including computer applications, necessary for engineering practice.

UNIT - I

Sources of Pollution - Physical, Chemical, Organic & Biological properties of Industrial Wastes - Difference between industrial & municipal waste waters - Effects of industrial effluents on sewers and Natural water Bodies.

UNIT - II

Pre & Primary Treatment - Equalization, Proportioning, Neutralization, Oil separation by Floating-Waste Reduction-Volume Reduction-Strength Reduction.

UNIT - III

Waste Treatment Methods - Nitrification and De-nitrification-Phosphorous removal -Heavy metal removal - Membrane Separation Process - Air Stripping and Absorption Processes - Special Treatment Methods - Disposal of Treated Waste Water.

UNIT - IV

Characteristics and Composition of waste water and Manufacturing Processes of Industries like Sugar, Characteristics and Composition of Industries like Food processing Industries, Steel, and Petroleum Refineries.

UNIT - V

Characteristics and Composition of Industries like Textiles, Tanneries, Atomic Energy Plants and other Mineral Processing Industries – Joint Treatment of Raw Industries waste water and Domestic Sewage – Common Effluent Treatment Plants(CETP) – Location, Design, Operation and Maintenance Problems – Economical aspects.

Textbooks:

1. Wastewater engineering Treatment disposal reuse by Metcalf & Eddy, Tata McGraw Hill.

2. Industrial Water Pollution Control by Eckenfelder, W.W., McGraw-Hill

Reference Books:

1. Industrial Waste by M.N. Rao and Dutta CBS Publishers and Distributors Pvt Ltd; 3rd edition (January 30, 2018)
2. Water & Wastewater Technology by Mark J. Hammer, Mark J. Hammer, Jr., Prentice Hall of India.
3. Theories and practices of Industrial Waste Engineering by N.L. NemerrowAddison-Wesley publishers

4.Principles of Industrial Waste Engineering by C.G. GurnhamWiley publishers

Online Learning Resources:

https://nptelvideos.com/video.php?id=1118

(Common to All Branches)
Open Elective Course-II

Course Code	Disaster Management	L	T	P	C
20A60105		3	0	0	3
	Semester	VI			

Course Objectives:

1. To give knowledge types of disasters and stages in disaster rehabilitation process.
2. To make awareness on change in climates and their impacts on occurrence of environmental disasters.
3. To impart knowledge on Consideration of wind and water effects as per codal provisions to withstand disasters.
4. To familiarize the student with the Causes of earthquake and their effects and remedial methods to be adopted for buildings.
5. To illustrate the methodology in Planning and design considerations of various structures constructing in disaster prone areas.

Course Outcomes (CO):

1. Understand about various types of disasters and stages in disaster rehabilitation process.
2. Impact of change in climates and their impacts on occurrence of environmental disasters.
3. Adopting suitable codal provisions to study the effect of wind and water effects on various structures constructed at disaster prone areas.
4. Understand the causes of earthquake and their effects and remedial methods to be adopted for buildings.
5. Adopt suitable Planning and design considerations of various structures constructing in disaster prone areas.

UNIT - I

Brief introduction to different types of natural disaster, Occurrence of disaster in different climatic and geographical regions, hazard (earthquake and cyclone) map of the world and India, Regulations for disaster risk reduction, Post disaster recovery and rehabilitation (socioeconomic consequences)

UNIT - II

Climate change and its impact on tropical cyclone, Nature of cyclonic wind, velocities and pressure, Cyclone effects, Storm surge, Floods, Landslides. Behavior of structures in past cyclones and wind storms, case studies. Cyclonic retrofitting, strengthening of structures and adaptive sustainable reconstruction. Life–line structures such as temporary cyclone shelter.

UNIT - III

Basic wind engineering, aerodynamics of bluff bodies, vortex shedding and associated unsteadiness along and across wind forces. Lab: Wind tunnel testing, its salient features. Introduction to Computational fluid dynamics. General planning/design considerations under wind storms & cyclones; Wind effects on buildings, towers, glass panels etc, & wind resistant features in design. Codal Provisions, design wind speed, pressure coefficients; Coastal zoning regulation for construction & reconstruction phase in the coastal areas, innovative construction material & techniques, traditional construction techniques in coastal

areas.

UNIT - IV

Causes of earthquake, plate tectonics, faults, seismic waves; magnitude, intensity, epicenter, energy release and ground motions. Earthquake effects – On ground, soil rupture, liquefaction, landslides. Performance of ground and building in past earthquakes: Behavior of various types of buildings, structures, and collapse patterns; Behavior of Non-structural elements like services, fixtures, mountings- case studies. Seismic retrofitting- Weakness in existing buildings, aging, concepts in repair, restoration and seismic strengthening.

UNIT - V

General Planning and design consideration; Building forms, horizontal and vertical eccentricities, mass and stiffness distribution, soft storey etc.; Seismic effects related to building configuration. Plan and vertical irregularities, redundancy and setbacks. Various Types and Construction details of: Foundations, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, under-ground – overhead tanks, staircases and isolation of structures; innovative construction material and techniques; Local practices: traditional regional responses; Computational investigation techniques.

Textbooks:

1. Disaster Management by Rajib Shah, Universities Press, India, 2003
2. Disaster Management by R.B. Singh (Ed) Rawat Publication, New Delhi, 2000

Reference Books:

1. Natural disasters. By Abbott, L. P. (2013) 9th Ed. McGraw-Hill.
2. Earthquake Resistant Design of Structures. By Agarwal, P. and Shrikhande, M. (2009). New Delhi : PHI Learning.
3. Mapping Vulnerability: Disasters, Development and People. byBankoff, G., Frerks, G. and Hilhorst, D. (2004). London :Earthscan.
4. Improving Earthquakes and Cyclone Resistance of Structures:Guidelines for the Indian Subcontinent. TERI
5. Disaster Mitigation, preparedness, recovery and Response. By Sinha, P. C. (2006). New Delhi : SBS Publishers.
6. World Bank. (2009). Handbook for Reconstructingafter Natural Disasters.

Online Learning Resources:

Course Code	Highway Materials Lab	L	T	P	C
20A60106		0	0	3	1.5
	Semester	VI			

Course objectives: By the end of this course student will be able to

1. Test the aggregates for their suitability for use in Road Construction
2. Understand the Test procedures for determination of Crushing Strength , Impact Value, Abrasion Value of Aggregates
3. Understand the Importance of Shape of aggregates and Test Procedures to determine the same
4. Able to Test Bitumen to find out the Penetration Value, Ductility Value, Softening Point and Fire and Flash Point
5. Find out the Optimum Bitumen Content in a Bituminous Concrete by Marshall Stability Test.

List of Experiments:

TESTS ON ROAD AGGREGATES:

- Aggregate Crushing value Test.
- Aggregate Impact Test.
- Abrasion Test.
- Shape tests

TESTS ON BITUMINOUS MATERIALS:

- Penetration Test.
- Ductility Test.
- Softening Point Test.
- Flash and fire point tests.
- Demo on Marshall Stability Test on Bituminous Mixes

The Course Outcomes are:

1. Ability to conduct Tests on Aggregates for their suitability in Road Construction
2. Ability to conduct Tests on Bitumen to know its grade and suitability in Road Construction
3. Knowledge and Hands on experience on Laboratory Tests on Aggregates and Bitumen
4. Understanding of the Bituminous Concrete Mix Design Procedure
5. Overall knowledge about Highway Materials, Tests on them and Interpretation of Results

References:

Highway Material Testing and Quality Control (English, Paperback, G. Venkatappa Rao, K. Ramachandra Rao, KausikPahari, D.V. Bhavanna Rao) Dreamtech Press

Course Code	Geotechnical Engineering Lab - II	L	T	P	C
20A60107		0	0	3	1.5
	Semester	VI			

Course Objectives:

1. To enable the students to know the various physical and engineering properties of soils
2. To carry out laboratory tests and find out the grain size distribution
3. To perform laboratory tests to determine the compaction characteristics of the soil
4. To carry out the tests and to determine shear strength and coefficient of consolidation ofsoil
5. To determine the bearing capacity of soil by conducting field tests

List of Experiments:

1. Hydrometer Analysis on soils
2. Shrinkage limit test
3. Modified Proctor Compaction Test
4. Unconfined Compression Test
5. Vane – Shear Test
6. Tri-Axial Compression Test (Quick Test)
7. Determination of Co-Efficient of Consolidation
8. Soaked CBR test
9. Demo on SPT
10. Demo on Plate Load Test

Course Outcomes (CO):

At the end of the course, the student will be able to:

1. Classify the soil based on grain size and Atterberg limits.
2. Effect of compaction energy on OMC and MDD
3. Determine Shear strength parameters of soil by conducting Triaxial compression test
4. Determine the coefficient of consolidation of soil and thereby predicting its settlement
5. Estimate the bearing capacity of soil in natural condition

Course Code	Computer Aided Drafting lab – II	L	T	P	C
20A60108		0	0	3	1.5
	Semester	VI			

Course Objectives

1. Teach drawing of line diagrams, plans, sections and elevations for school building using CAD software.
2. Teach drawing of line diagrams, plans, sections and elevations for hostel building using CAD software.
3. Teach drawing of line diagrams, plans, sections and elevations for hospital building using CAD software.
4. Teach drawing of line diagrams, plans, sections and elevations for a bank using CAD software.
5. Teach drawing of line diagrams, plans, sections and elevations for an assembly building using CAD software.

List of Experiments:

1. Drawing of Line diagram of School Building Using CAD software.
2. Drawing of Plan, Section & Elevation for School Building Using CAD Software.
3. Drawing Line diagram for Hostel Building.
4. Drawing of Plan, Section & Elevation for Hostel Building Using CAD Software.
5. Drawing of Line diagram of Hospital Building Using CAD software.
6. Drawing of Plan, Section & Elevation for Hospital Building Using CAD Software.
7. Drawing Line diagram for Bank Building.
8. Drawing of Plan, Section & Elevation for Bank Building Using CAD Software.
9. Drawing of Line diagram of Assembly Building Using CAD software.
10. Drawing of Plan, Section & Elevation for Assembly Building Using CAD Software.
11. Drawing Line diagram for Industrial Building.
12. Drawing of Plan, Section & Elevation for Industrial Building Using CAD Software.

Course Outcomes

1. Able to draw line diagrams, plans, sections and elevations for school building using CAD software.
2. Able to draw line diagrams, plans, sections and elevations for hostel building using CAD software.
3. Able to draw line diagrams, plans, sections and elevations for hospital building using CAD software.
4. Able to draw line diagrams, plans, sections and elevations for a bank using CAD

software.

5. Able to draw line diagrams, plans, sections and elevations for an assembly building using CAD software.

References:

Engineering graphics with Auto CAD - R.B. Choudary , Anuradha Publishes

Online Learning Resources/Virtual Labs:

(Common to CE, MECH, CHEM)

Course Code	Soft Skills	L	T	P	C
20A65502		1	0	2	2
Pre-requisite					

Course Objectives:

- ➢ To encourage all round development of the students by focusing on soft skills
- ➢ To make the students aware of critical thinking and problem-solving skills
- ➢ To develop leadership skills and organizational skills through group activities
- ➢ To function effectively with heterogeneous teams

Course Outcomes (CO):

By the end of the program students should be able to

- Define various elements of effective communicative skills
- Understanding people using emotional intelligence
- apply critical thinking skills in problem solving
- analyse the needs of an organization for team building
- Assess the situation and take necessary decisions as a leader
- Creating a productive work place atmosphere using social and work-life skills ensuring personal and emotional well-being

UNIT – I **Soft Skills & Communication Skills** Lecture Hrs

Introduction, meaning, significance of soft skills – definition, significance, types of communication skills - Intrapersonal & Inter-personal skills - Verbal and Non-verbal Communication

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Inter personal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation

UNIT – II Lecture Hrs

Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking

Activities

:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues –placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT – III Lecture Hrs

Problem Solving & Decision Making

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Methods of decision making – Effective decision making in teams – Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion

UNIT – IV **Emotional Intelligence & Stress Management** Lecture Hrs

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

UNIT – V **Leadership Skills** Lecture Hrs

Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk-Taking - Team Building - Time Management

Activities

Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making , Group discussion etc.

NOTE-:

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear or for good Leadership – Mahendar Singh Dhoni etc.

Textbooks:

1. Personality Development and Soft Skills (English, Paperback, Mitra Barun K.)Publisher : Oxford University Press; Pap/Cdr edition (July 22, 2012)
2. Personality Development and Soft Skills: Preparing for Tomorrow, Dr Shikha KapoorPublisher : I K International Publishing House; 0 edition (February 28, 2018)

1. Reference Books:

1.Soft skills: personality development for life success by prashantsharma, BPB publications 2018.

2. Soft Skills By Alex K. Published by S.Chand
3. Soft Skills: An Integrated Approach to Maximise Personality Gajendra Singh Chauhan, Sangeetha Sharma Published by Wiley.
4. Communication Skills and Soft Skills (Hardcover, A. Sharma) Publisher: Yking books
5. SOFT SKILLS for a BIG IMPACT (English, Paperback, RenuShorey) Publisher: Notion Press
6. Life Skills Paperback English Dr. Rajiv Kumar Jain, Dr. Usha Jain Publisher : Vayu Education Of India

Online Learning Resources:

1. **https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q**
2. **https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ**
3. **https://youtu.be/-Y-R9hDl7lU**
4. **https://youtu.be/gkLsn4ddmTs**
5. **https://youtu.be/2bf9K2rRWwo**
6. **https://youtu.be/FchfE3c2jzc**

JNTUA College of Engineering (Autonomous), Ananthapuramu
Mandatory Non-credit Course VI
INTELLECTUAL PROPERTY RIGHTS & PATENTS
Common to CE, MECH, CHEM
INTELLECTUAL PROPERTY RIGHTS & PATENTS

Course Code	L	T	P	C
20A69901	2	0	0	0

Course Objectives:·

1. To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights.
2. To help them in knowing the significance of real life practice and procedure of Patents.
3. To make the students to understand the statutory provisions of different forms of IPRs in simple forms.
4. To enable them learn the procedure of obtaining Patents, Copyrights, & Trade Marks
5. To enable the students to keep their IP rights alive.

Course Outcomes: On successful completion of this course, the students will be able to:

CO1:Identify different types of intellectual properties (IPS), the right of ownership, scope of protection
CO2: Understand and defining various types of intellectual properties and their roles in contributing to organizational competitiveness.
CO3: Apply statutory provisions to protect particular form of IPRs.
CO 4: Analyze rights and responsibilities of holder of Patent, Copyright, Trademark, International Trademark etc.
CO:5 Evaluate different forms of IPR available at national & international level
CO:6 Develop skill of making search of various of forms of IPR by using modern tools and techniques.

SYLLABUS

UNIT – I:
Introduction to Intellectual property: Introduction, types of intellectual property, International organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II:
Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT – III:
Patents: Introduction to Patents – Laws Relating to Patents in India – Patent Requirements,Patent Registration and Granting of Patent – Exclusive Rights – Limitations – Ownership and Transfer — Revocation of Patent. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

UNIT – IV:
Trade Secrets: New developments in Patents – Software Protection and Computer related Innovations Trade secretes law, determination of trade secretes status, liability for misappropriations of trade secrets, and protection for submission, trade secrets litigation.Unfair competition: Misappropriation - Right of publicity, False advertising.

UNIT – V:
New development of intellectual property: New developments in trade mark law: copy right law, patent law, intellectual property audits.
International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

Textbooks:

1. Deborah. E. Bouchoux, Intellectual Property Rights, Cengage Learning India, 2013
2. P.Naryan, "Intellectual Property Law", 3rd Ed ,Eastern Law House, 2007.

Reference Books:

R.Myneni, Law of Intellectual Property", 9th Ed, Asia law House, 2019.
PrabuddhaGganguli, ,Intellectual Property Rights Tata Mcgraw Hill, 2001.

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Course Code	Railways, Airports, Docks and Harbor Engineering	L	T	P	C
20A70101a		3	0	0	3

Semester -VII

COURSE OBJECTIVE:

The objectives of this course are:

1 Ability to explain the components of permanent way and its components and their functions and requirements.
2 Ability to explain the geometric design elements of Railway track like cant, radius of curve and degree of curve etc..and their design components.
3 Ability to the Aircraft characteristics and their influence on various design elements of an Airport.
4 Ability to explain the concepts of runway orientation, Airport lighting, Airport components and their planning and geometric design of runways and taxiways.
5 Ability to explain the difference between ports and Harbours, types of Ports and Harbours, various facilities needed in Ports and Harbours and NavigationalAids for ships.

COURSE OUTCOMES:

On completion of the course, the students will be able to

1	Understand the components of permanent way and its components and their functions and requirements.
2	Understand the geometric design elements of Railway track like cant, radius of curve and degree of curve etc..and their design components.
3	understand the Aircraft characteristics and their influence on various design elements of an Airport.
4	Understand the concepts of runway orientation, Airport lighting, Airport components and their planning and geometric design of runways and taxiways.
5	Understand the difference between ports and Harbours, types of Ports and Harbours,various facilities needed in Ports and Harbours and NavigationalAids for ships.

Unit – I

Railway Engineering:

Introduction – Permanent way components – Cross section of permanent way – Functions and requirements of rails, sleepers and ballast – Types of gauges – Creep of rails – Theories related to creep – Coning of wheels – adzing of sleepers – Rail fastenings.

Unit – II

Geometric design of railway track

Gradients – Grade compensation – Cant and negative super elevation – Cant deficiency – Degree of curves – Safe speed on railway track – Points and crossings – Layout and functioning of left hand turn out and right hand turn outs – Station yards – Signaling and interlocking.

Unit –III

Airport Engineering

Airport site selection – Factors affecting site selection and surveys- Runway orientation – Wind rose diagram – basic runway length – Correction for runway length – Terminal area – Layout and functions – Concepts of terminal building – Simple building , Linear concept, pier concept and satellite concept – Typical layouts .

Unit – IV

Geometric design of runways and taxiways

Aircraft characteristics – Influence of characteristics on airport planning and design – Geometric design elements of runway – Standards and specifications - Functions of taxiways – Taxiway geometric design – Geometric elements and standard specifications – Runway and taxiway lighting.

Unit – V

Ports and Harbors

Requirements of ports and harbors – Types of ports – Classification of harbors – Docks and types of docks – Dry docks, wharves and jetties – Breakwaters: layouts of different types of harbors and docks – Dredging operations – navigation aids.

Text books:

1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi.
2. Satish Chandra and Agarwal, M.M. (2007) "Railway Engineering" Oxford Higher Education, University Press New Delhi.
3. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros.
4. A Text book of Transportation Engineering – S.P.Chandola – S.Chand& Co. Ltd. – (2001).
5. Railway Track Engineering by J.S.Mundrey

References:

1. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian, Scitechpubilishers.
2. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing House Pvt. Limited, 2009
3. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza, Chartor Publishers pvt ltd.

Course Code	Ground Improvement Techniques	L	T	P	C
20A70101b		3	0	0	3
	Semester	VII			

Course Objectives:

1. Understand the fundamental concept of ground improvement techniques.
2. Apply knowledge of densification methods.
3. Understand the concepts of stabilization mechanical & chemical methods.
4. Impart knowledge of components of reinforced earth & design of reinforced earth walls.
5. Understanding the identification & foundation techniques.

Course Outcomes (CO):

1. Understand the Dewatering and grouting techniques
2. Understand the densification methods used in granular soils and Cohesive soils
3. Understand the ground Improvement methods used to stabilize soil.
4. Understand the reinforcement design principles and geosynthetic materials, functions and applications.
5. Identify the problems in Expansive soils

UNIT - I

DEWATERING: Methods of de-watering- Sumps and interceptor ditches- Single, multi stage well points - Vacuum well points- Horizontal wells-foundation drains-blanket drains - Criteria for selection of fill material around drains –Electro-osmosis .

GROUTING: Objectives of grouting- Grouts and their properties- Grouting methods-ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- Post grout test.

UNIT - II

DENSIFICATION METHODS IN GRANULAR SOILS:

In – situ densification methods in granular Soils– Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth.

DENSIFICATION METHODS IN COHESIVE SOILS:

In – situ densification methods in Cohesive soils:– Preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

UNIT - III

STABILISATION: Methods of stabilization-mechanical-cement- Lime-bituminous-Chemical stabilization with calcium chloride, sodium silicate and gypsum

UNIT - IV

REINFORCED EARTH: Principles – Components of reinforced earth – Factors governing design of reinforced earth walls – Design principles of reinforced earth walls.

GEOSYNTHETICS: Geotextiles- Types, Functions and applications – Geogrids and geomembranes – Functions and applications.

UNIT - V

EXPANSIVE SOILS: Problems of expansive soils – Tests for identification – Methods of determination of swell pressure. Improvement of expansive soils – Foundation

techniques in expansive soils – Under reamed piles.

Textbooks:

1. Engineering Principles of Ground Modification, Haussmann M.R. , McGraw-Hill International Edition(1990).
2. Ground Improvement Techniques, Dr.P.Purushotham Raj. Laxmi Publications, New Delhi / University science press, New Delhi 2nd edition 2016
3. Ground Improvement Techniques, NiharRanajanPatraVikas Publications, New Delhi

Reference Books:

1. Ground Improvement, Moseley M.P. Blackie Academic and Professional, Boca Taton, Florida, USA(1993).
2. Ground Control and Improvement, Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) John Wiley and Sons, New York, USA.
3. Designing with Geosynthetics, Robert M. Koerner, Prentice Hall New Jersey, USA

Online Learning Resources:

https://nptel.ac.in/courses/105108075

Course Code	Repair and Rehabilitation of Structures	L	T	P	C
20A70101c		3	0	0	3
	Semester	VII			

Course Objectives:
1.To learn various distress and damages to concrete and masonry structures
2.To understand the importance of maintenance of structures
3.To asses the damage to structures using various tests
4.To study the various types and properties of repair materials
5.To learn various repair techniques of damaged structures, corroded structures
Course Outcomes (CO):
1.Understand corrosion effects
2. Understand the causes of deterioration in structures
3. Assess the damaged structures using NDT techniques
4.Understand the surface repair of structures
5. Identify different types of strengthening and stabilization techniques used for existing structure

UNIT - I
Introduction, significance of corrosion, and corrosion mechanisms - Embedded metal corrosion
UNIT - II
Deterioration of cementations systems – Sulphate and Acid attack - Alkali Silica Reaction (ASR), Shrinkage, and others
UNIT - III
Concrete assessment using non-destructive tests (NDT) - Concrete assessment and load effects
UNIT - IV
Surface repair – Condition assessment – Analysis, strategy, and design – Material requirement, surface preparation, placement of repair material
UNIT - V
Strengthening and stabilization -Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake-Transportation of Structures from one place to other -Structural Health Monitoring- demolition techniques-Engineered demolition methods-Case studies, Study of structural conditions of heritage buildings.

Textbooks:
1. Concrete Repair and Maintenance by Peter H. Emmons, R.S. Means Company, Kingston, MA, USA.
2. Maintenance Repair & Rehabilitation & Minor Works of Buildings by P.C. Varghese, PHI Learning Pvt. Ltd., New Delhi.

Reference Books:
1. Concrete Repair to EN1504 – Diagnosis, Design, Principles and Practice by Michael Raupach and Till Buttner, CRC Press.,
2. Concrete Structures – Protection, Repair and Rehabilitation by R. Dodge Woodson, Butterworth-Heinemann – Elsevier, UK

Online Learning Resources:
https://nptel.ac.in/courses/105106202

Course Code	Finite Element Methods	L	T	P	C
20A70102a		3	0	0	3
	Semester	VII			

Course Objectives:

1. Implement the basics of FEM to relate stresses and strains
2. Formulate the design and heat transfer problems with application of FEM.
3. Solve 1 D, 2 D and dynamic problems using Finite Element Analysis approach
4. To impart preliminary knowledge of analyzing structures using finite element method.
5. To learn advanced methods of structural analysis and to apply these methods for analysis of indeterminate structures.

Course Outcomes (CO):

1. Understand the fundamental ideas of FEM.
2. Develop shape functions and stiffness matrices for different elements
3. Generate global stiffness matrices and global load vectors
4. Develop a solution for Iso-parametric elements for 2D analysis .
5. Understand the numerical integration and solution techniques in FEM

UNIT - I

Introduction : Concepts of FEM – Steps involved – Merits & Demerits – Energy principles – Discretization – Rayleigh –Ritz method of functional approximation. Principles of Elasticity: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT - II

One Dimensional & Two Dimensional Elements :Stiffness matrix for bar element – Shape functions – 1D and 2D elements – Types of elements for plane stress and plane strain analysis – Displacement models – Generalized coordinates – Shape functions – Convergent and compatibility requirements – Geometric invariance – Natural coordinate system – Area and volume coordinates

UNIT - III

Element stiffness matrix : Generation of element stiffness and nodal load matrices for 3-node triangular element and four -noded rectangular elements.

UNIT - IV

Iso-parametric Formulation : Iso-parametric elements for 2D analysis –Formulation of CST element, 4 – nodded and 8-noded Iso-parametric quadrilateral elements – Lagrangian and Serendipity elements.

AXI-SYMMETRIC ANALYSIS: Basic principles-Formulation of 4-noded iso-parametric Axi-symmetric element.

UNIT - V

Solution techniques : Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Textbooks:

1. Finite Element Analysis for Engineering and Technology, by Tirupathi R Chandraputla, Universities Press Pvt Ltd, Hyderabad. 2003.
2. Finite Element analysis-Theory & Programming, by C. S. Krishna MurthyTataMc.Graw Hill Publishers.

Reference Books:

1. Finite element analysis and procedures in engineering, by H.V. Lakshminaryana, 3rd edition, Universities press, Hyderabad.
2. Concepts and applications of Finite Element Analysis, by Robert D. Cook, Michael E Plesha, John Wiley & sons Publications
3. Finite element analysis in Engineering Design, by S. Rajasekharan, S. Chand Publications, New Delhi.

Online Learning Resources:

https://nptel.ac.in/courses/105106051

Course Code	Advanced Structural Engineering	L	T	P	C
20A70102b		3	0	0	3
	Semester	VII			

Course Objectives:

1. To teach concepts of concrete beams and slabs by following different codes by BS 8110 - Euro code – ACI - IS 456
2. To Understand Estimation Of Crack width In -Beams , Shrinkage And Thermal Cracking By IS 456 Of BS 8110
3. To impart design procedure of Shear In Flat Slabs And Flat Plates
4. To impart design Of Plain Concrete Walls And Shear Walls
5. To demonstrate design of Design Of Reinforced Concrete Members For Fire Resistance by ISO 834 Standard Heating Conditions

Course Outcomes (CO):

1. Understand the basic concepts of concrete beams and slabs by different codes
2. To know the concepts of deep beams by British practice-ACI –IS 456
3. Apply design concepts to Shear In Flat Slabs And Flat Plates
4. Apply design concepts to Plain Concrete Walls And Shear Walls
5. Understand the basic concepts of fire resistance

UNIT - I

Deflection Of Reinforced Concrete Beams And Slabs: Introduction -Short-Term Deflection Of Beams And Slabs -Deflection Due To - Imposed Loads - Short- Term Deflection Of Beams Due To Applied Loads- Calculation Of Deflection By IS 456 - Calculation Of Deflection By BS 8110 - Deflection Calculation By Euro code – ACI Simplified Method - Deflection Of Continuous Beams By IS 456 - Deflection Of Cantilevers - Deflection Of Slabs

UNIT - II

Estimation Of Crack Width In Reinforced Concrete Members And Design Of Deep Beams: Introduction - Factors Affecting Crack width In Beams - Mechanism Of Flexural Cracking Calculation Of Crack Widths - Simple Empirical Method - Estimation Of Crack width In - Beams By IS 456 Of BS 8110 - Shrinkage And Thermal Cracking. Deep Beams: Introduction - Minimum Thickness - Steps Of Designing Deep Beams - Design By IS 456 - Design According To British Practice - ACI Procedure For Design Of Deep Beams - Checking For Local Failures - Detailing Of Deep Beams.

UNIT - III

Shear In Flat Slabs And Flat Plates: Introduction - Checking For One-Way (Wide Beam) Shear - Two-Way (Punching) Shear Permissible Punching Shear - Shear Due To Unbalanced Moment (Torsional Moments) Calculation Of J Values - Strengthening Of Column Areas For Moment Transfer By Torsion Which Produces Shear - Shear Reinforcement Design - Effect Of Openings In Flat Slabs - Recent Revisions In ACI 318 - Shear In Two – Way Slabs With Beams.

UNIT - IV

Design Of Plain Concrete Walls And Shear Walls: Introduction - Braced And Unbraced Walls - Slenderness Of Walls- Eccentricities Of Vertical Loads At Right Angles To Wall - Empirical Design Method For Plane Concrete Walls Carrying Axial Load - Design Of Walls For In-Plane Horizontal Forces - Rules For Detailing Of Steel In Concrete Walls Design Of Shear Walls: Introduction - Classification Of Shear Walls - Classification According To

Behavior - Loads In Shear Walls - Design Of Rectangular And Flanged Shear Walls - Derivation Of Formula For Moment Of Resistance Of Rectangular Shear Walls

UNIT - V

Design Of Reinforced Concrete Members For Fire Resistance : Introduction - ISO 834 Standard Heating Conditions- Grading Or Classification - Effect Of High Temperature On Steel And Concrete - Effect Of High Temperatures On Different Types Of Structural Members - Fire Resistance By Structural Detailing From Tabulated Data - Analytical Determination Of The Ultimate Bending Moment Capacity Of Reinforced Concrete Beams Under Fire - Other Considerations

Textbooks:

1. Structural Design and Drawing: Reinforced Concrete and Steel, Fourth Edition, N Krishna Raju, Universities Press, 2022
2. Reinforced Concrete Structural Elements: Behaviour, Analysis and Design, by P.Purushothaman, Tata Mcgraw Hill.

Reference Books:

1. Reinforced Concrete Desigers Hand Bood, by C.E. Reynolds And J.C. Steedman, A View Point Publication.
2. Limit State Design Of Reinforced Concrete Structures By P.Dayaratnam, Oxford &Ibh Publishers.
3. Advanced Rcc By N.KrishnaRaju, Cbs Publishers & Distributors.
4. Reinforced Cement Concrete Structures – DevdasMenon&Unnikrishna Pillai, Pearson Publishers

Online Learning Resources:

Course Code	Hydraulic Structures and Water Power	L	T	P	C
20A70102c	Engineering	3	0	0	3
	Semester	VII			

Course Objectives:

1. Introduce the types of irrigation systems and introduce the concepts of planning and design of irrigation systems
2. Understand design methods of erodible and non-erodible canals
3. Know the principles of design of hydraulic structures on permeable foundations
4. Know the concepts for analysis and design principles of storage and diversion works.
5. Learn design principles of canal structures

Course Outcomes (CO):

1. Understand the concepts of Cross Drainage works and Canal Regulation works
2. Understand various stream flow measurements technique and basic concepts in river engineering
3. Determine the storage capacity of reservoir and yield from the reservoir
4. Analyze the stability of gravity dam and seepage pattern in earth dam
5. understand about the spillways, Gates & Energy dissipaters.

UNIT - I

CANAL REGULATION WORKS: Canal falls: Necessity and location of falls; Types of falls; Classification of falls; Design of sarada type fall.

Canal regulators: head regulators and cross-regulators; design of cross-regulator and distributary head regulator.

CROSS DRAINAGE WORKS: Introduction; types of cross drainage works; selection of suitable type of cross drainage work; classification of aqueducts and siphon aqueducts.

UNIT - II

STREAM GAUGING: Necessity; Selection of gauging sites; Methods of Discharge Measurement Area-Velocity method; Slope-Area method; Tracer method, Electromagnetic induction method, Ultrasonic method; Measurement of depth – Sounding rod, Echo-Sounder; Measurement of velocity: Floats – Surface floats, Sub–Surface float or Double float, Velocity rod; Pitot tube ;Current meter- Rating of current meter, measurement of velocity; chemical method; Measurement of stage-Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage-discharge curve.

RIVER ENGINEERING:

Classification of rivers; Meandering; Causes of meandering; Basic factors controlling process of meandering; Aggrading type of river; Degrading type of River.

UNIT - III

RESERVOIR PLANNING:

Introduction; Investigations for reservoir planning; Selection of site for a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass in flow curve; Determination of safe yield from a reservoir of a given capacity; Sediment flow in streams: Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Flood routing; Methods of flood routing-Graphical Method (Inflow – Storage discharge curves method).

DAMS :GENERAL: Introduction; Classification according to use; Classification according to material- Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams-Advantages and disadvantages; Physical factors governing selection of type of dam ; selection of site for a dam.

UNIT - IV

GRAVITY DAMS: Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure: stability requirements; principal and shear stresses; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam- High and low gravity dams; Design of gravity dams–single step method;

EARTH DAMS: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures;

UNIT - V

SPILLWAYS: Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons; Spillway crest gates-Types and description only.

WATER POWER ENGINEERING: Development of hydro power in India; Classification of hydel plants: runoff river plants, storage plants and pumped storage plants; low, medium and high head schemes.

Textbooks:

1. Irrigation and Water Power Engineering by Dr.B.C.Punmia&Dr.Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi 17th edition 2021
2. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi 36th edition

Reference Books:

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Irrigation, Waterpower and Water Resources Engineering by K R Arora; Standard Publication,New Delhi 2010
3. Water resources engineering by Satyanarayana Murthy. Challa, New Age International Publishers 2020

Online Learning Resources:

https://nptel.ac.in/courses/105105110

(Common to All Branches)

Course Code	MANAGEMENT SCIENCE	L	T	P	C
20A75401a		3	0	0	3
Pre-requisite	Sem-VII				

COURSE OBJECTIVES: The objectives of this course are

1	To provide fundamental knowledge on management, administration, organization & its concepts.
2	To make the students understand the role of management in Production process and marketing management
3	To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
4	To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
5	To make the students aware of the contemporary issues in management

Course Outcomes (CO): At the end of the course, students will be able to

1	Define the Management, and its Functions
2	Understand the concepts & principles of management and designs of organization in a practical world
3	Apply the knowledge of Work-study principles & Quality Control techniques in industry
4	Analyse the concepts of HRM in Recruitment, Selection and Training & Development.
5	Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyse the business through SWOT.
6	Create Modern technology in management science.

UNIT - I **INTRODUCTION TO MANAGEMENT**

Management - Concept and meaning - Nature-Functions - Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles - Elton Mayo's Human relations - Systems Theory - **Organizational Designs** - Line organization - Line & Staff Organization - Functional Organization - Committee form of Organization - Social responsibilities of Management.

LEARNING OUTCOMES: At the end if the Unit, the learners will be able to

- Understand the concept of management and organization
- Analyze the organization chart & structure for an enterprise.
- Apply the concepts & principles of management in real life industry.
- Evaluate and interpret the theories and the modern organization theory.

UNIT - II **OPERATIONS & MARKETING MANAGEMENT**

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), - Statistical Quality Control- **Materials Management -** Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Purchase Procedure - **Marketing Management -** Concept - Meaning - Nature-Functions of Marketing - Marketing Mix - Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on Product Life Cycle.

LEARNING OUTCOMES: At the end of the Unit, the learners will be able to

- Understand the core concepts of Management Science and Operations Management
- Apply the knowledge of Method of Production principles in real life industry.
- Analyze Marketing Mix Strategies for an enterprise
- Evaluate Materials departments & Determine EOQ
- Create and design advertising and sales promotion

UNIT - III **HUMAN RESOURCES MANAGEMENT (HRM)**

HRM - Evolution of HRM - Definition and Meaning – Nature - Managerial and Operative functions - - Job Analysis - Human Resource Planning (HRP) – Process of Recruitment &Selection - Training and Development - Performance Appraisal - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration.

LEARNING OUTCOMES: At the end if the Unit, the learners will

- Understand the concepts of HRM in Recruitment, Selection, Training & Development
- Apply Managerial and operative Functions of HRM
- Analyze the need of training
- Evaluate performance appraisal Techniques
- Design the basic structure of salaries and wages Administration.

UNIT - IV **STRATEGIC & PROJECT MANAGEMENT**

Strategy Definition & Meaning - Vision - Mission - Goals - Steps in Strategy Formulation and Implementation - SWOT Analysis **Project Management -** Network Analysis - Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Project Crashing (Simple problems).

LEARNING OUTCOMES: At the end of the Unit, the learners will be able to

- Understand Mission, Objectives, Goals & strategies for an enterprise
- Apply SWOT Analysis to strengthen the project
- Analyze Strategy formulation and implementation
- Evaluate PERT and CPM Techniques
- Creative in completing the projects within given time

UNIT - V **Contemporary Issues In Management**

The concept of Management Information System (MIS) - Materials Requirement Planning (MRP) - Customer Relations Management (CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management (SCM) - Enterprise Resource Planning (ERP) - Business Process Outsourcing (BPO) - Business Process Re-engineering - knowledge Management.

LEARNING OUTCOMES At the end if the Unit, the learners will be able to

- Understand modern management techniques
- Apply Knowledge in Understanding in modern management techniques
- Analyze Concept of CRM, MRP, TQM
- Evaluate Six Sigma concept and SCM

Textbooks:

1. A.R Aryasri, Management Science, TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 2012.

Reference Books:

1. Koontz &Weihrich, Essentials of Management, 6/e, TMH, 2005.
2. Thomas N.Duening& John M.Ivancevich, Management Principles and Guidelines, Biztantra.
3. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
4. Samuel C.Certo, Modern Management, 9/e, PHI, 2005

Online Learning Resources:

www.slideshare.net/jhayabesamis/chapter-1-the-nature-and-concept-of-management-122625641?
www.slideshare.net/vivekpratapsingh14/school-of-management-thoughts?
https://www.slideshare.net/89ajpaul/organizational-design-anf-structure
https://www.slideshare.net/sujeet2685/plant-layout-46555840#
https://www.slideshare.net/drmadhurverma/materials-38395397
https://www.slideshare.net/ShaliniShetty3/introduction-to-marketing-management-72210724?
https://www.slideshare.net/srinidhiraman/human-resource-management-ppt-43320777
https://www.slideshare.net/wicaksana/training-and-development-33535063
https://www.slideshare.net/ayushijain107/strategic-management-ppt-58012275

(Common to All Branches)

Course Code	**BUSINESS ENVIRONMENT**	**L**	**T**	**P**	**C**
20A75401b		**3**	**0**	**0**	**3**
Pre-requisite	**Sem-VII**				

Course Objectives:

1.	To make the student understand about the business environment
2.	To enable them in knowing the importance of fiscal and monitory policy
3	To facilitate them in understanding the export policy of the country
4.	To Impart knowledge about the functioning and role of WTO
5.	To Encourage the student in knowing the structure of stock markets

Course Outcomes (CO): At the end of the course, students will be able to

1.	Define Business Environment and its Importance.
2.	Understand various types of business environment.
3	Apply the knowledge of Money markets in future investment
4	Analyse India's Trade Policy
5	Evaluate fiscal and monitory policy
6	Develop a personal synthesis and approach for identifying business opportunities

UNIT - I **Overview of Business Environment**

Introduction – meaning Nature, Scope, significance, functions and advantages. Types - Internal & External, Micro and Macro. Competitive structure of industries - Environmental analysis - advantages & limitations of environmental analysis & Characteristics of business.

Learning Outcomes: - After completion of this unit student will

- Understand the concept of Business environment
- Classify various types of business environment
- Evaluate the environmental analysis in business
- Discuss the Characteristics of Business.

UNIT - II **Fiscal Policy**

Introduction – Nature, meaning, significance, functions and advantages. Public Revenues - Public Expenditure - Public debt - Development activities financed by public expenditure - Evaluation of recent fiscal policy of GOI. Highlights of Budget - Monetary Policy - Demand and Supply of Money – RBI - Objectives of monetary and credit policy - Recent trends - Role of Finance Commission.

Learning Outcomes: - After completion of this unit student will

- Understand the concept of public revenue and public Expenditure
- Identify the functions of RBI and its role
- Analyze the Monitory policy in India
- Know the recent trends and the role of Finance Commission in the development of our country

- Differentiate between Fiscal and Monitory Policy

UNIT - III **India's Trade Policy**

Introduction – Nature, meaning, significance, functions and advantages. Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - Balance of Payments– Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

Learning Outcomes: - After completion of this unit student will

- Understand the role of Indian international trade
- Understand and explain the need for Export and EXIM Policies
- Analyze causes for Disequilibrium and correction measure
- Differentiate between Bilateral and Multilateral Trade Agreements

UNIT - IV **World Trade Organization**

Introduction – Nature, meaning, significance, functions and advantages. Organization and Structure - Role and functions of WTO in promoting world trade - Agreements in the Uruguay Round – TRIPS, TRIMS, and GATT - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

Learning Outcomes: - After completion of this unit student will

- Understand the role of WTO in trade
- Analyze Agreements on trade by WTO
- Understand the Dispute Settlement Mechanism
- Compare and contrast the Dumping and Anti-dumping Measures.

UNIT - V **Money Markets and Capital Markets**

Introduction – Nature, meaning, significance, functions and advantages. Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI - Stock Exchanges - Investor protection and role of SEBI.

Learning Outcomes: - After completion of this unit student will

- Understand the components of Indian financial system
- Know the structure of Money markets and Capital markets
- Analyze the Stock Markets
- Apply the knowledge in future investments
- Understand the role of SEBI in investor protection.

Textbooks:

1.Business Environment Text & Cases: JUNE 2017
2. Francis Cherunilam (2009), International Business: Text and Cases, Prentice Hall of India.
3. K. Aswathappa, Essentials of Business Environment: Texts and Cases & Exercises 13th Revised Edition.HPH2016

Reference Books:

1.K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.
3. Chari. S. N (2009), International Business, Wiley India.
4.E. Bhattacharya (2009), International Business, Excel Publications, New Delhi.

Online Learning Resources:

https://www.slideshare.net/ShompaDhali/business-environment-53111245
https://www.slideshare.net/jitenparmar313/fiscal-policy-65521889
https://www.slideshare.net/ShikhaGupta31/indias-trade-policyppt
https://www.slideshare.net/prateeknepal3/ppt-mo

(Common to All Branches)

Course Code	**ORGANIZATIONAL BEHAVIOUR**	**L**	**T**	**P**	**C**
20A75401c		**3**	**0**	**0**	**3**
Pre-requisite	**Sem-VII**				

Course Objectives:

1	**To make them aware of concepts & analysis in organizational behaviour**
2	**To offer knowledge to students on self-motivation, leadership and management**
3	**To facilitate them to become powerful leaders**
4	**To Impart knowledge about group dynamics**
5	**To make them understand the importance of change and development**

COURSE OUTCOMES: At the end of the course, students will be able to

1	Define the Organizational Behaviour, its nature and scope
2	Understand the nature and concept of Organizational behaviour
3	Apply theories of motivation to analyse the performance problems
4	Analyse the different theories of leadership
5	Evaluate group dynamics
6	Develop as powerful leader

UNIT - I **Introduction Of Organizational Behavior and Various Concepts**

Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective - Understanding Individual Behavior – Attitude - Perception - Learning – Personality.

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the concept of Organizational Behavior
- Contrast and compare Individual & Group Behavior and attitude
- Evaluate personality types

UNIT - II **Motivation and Organization Outcome**

Theories of Motivation - Maslow's Hierarchy of Needs - Hertzberg's Two Factor Theory - Vroom's theory of expectancy - McClelland's theory of needs – Mc Gregor's theory X and theory Y – Adam's equity theory – Locke's goal setting theory –

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the concept of Motivation
- Analyze the Theories of motivation
- Explain how employees are motivated according to Maslow's Needs Hierarchy

UNIT - III **Leadership**

Introduction – Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership -

Qualities of good Leader - Alderfer's ERG theory – traits - Leaders Vs Managers.

Conflict Management - Evaluating Leader - Women and Corporate leadership.

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the concept of Leadership
- Contrast and compare Trait theory and Managerial Grid
- Distinguish the difference between Transactional and Transformational Leadership
- Evaluate the qualities of good leaders

UNIT - IV **Organizational Culture**

Introduction – Nature, Meaning, scope, definition and functions - Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the importance of organizational change and development
- Apply change management in the organization
- Analyze work stress management
- Evaluate Managerial implications of organization

UNIT - V **Organizational Change and Development**

Introduction – Nature, Meaning, scope, definition and functions - Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the importance of organizational change and development
- Apply change management in the organization
- Analyze work stress management
- Evaluate Managerial implications of organization

Textbooks:

1. Luthans, Fred, Organisational Behaviour, McGraw-Hill, 12 Th edition 2011
2. P Subba Rao, Organisational Behaviour, Himalya Publishing House 2017

Reference Books:

- McShane, Organizational Behaviour, TMH 2009
- Nelson, Organisational Behaviour, Thomson, 2009.
- Robbins, P.Stephen, Timothy A. Judge, Organisational Behaviour, Pearson 2009.
- Aswathappa, Organisational Behaviour, Himalaya, 2009

https://www.slideshare.net/payalrchhabra/organisational-behavior-15668552
https://www.slideshare.net/nilendrakumar7/motivation-and-team-building
https://www.slideshare.net/Knight1040/organizational-culture-9608857
https://www.slideshare.net/harshrastogi1/group-dynamics-159412405
https://www.slideshare.net/kohlisudeep18/organisational-developmet

(Common to All Branches)

Open Elective Course- III

Course Code	Building Technology for Engineers	L	T	P	C
20A70104		3	0	0	3
	Semester	VII			

Course Objectives :

1. To make the student familiar with varioustypes of Buildings and its components
2. To teach the students about general requirements of building regarding safety and transportation
3. To impart knowledge on various special requirements of buildings regarding ventilation, insulation acoustics, etc,.
4. To make the student familiar with the concepts of various Prefabrication systems.
5. To Teach the students about various construction equipments used in building.

Course Outcomes:

By the end of this course the student will be able to

1. Classify various types of buildings and its components.
2. Understand the general requirements of building regarding safety and transportation.
3. Understand the Special requirements of buildings regarding ventilation, insulation acoustics, etc,.
4. Familiarize with the concepts of various Prefabrication systems.
5. Understand various construction equipments used in building.

UNIT-1

Building planning: Types of Buildings — components, definitions, economy and design, Principles and aspects of building planning, Definitions and importance of Grouping and circulation; Lighting and ventilation; Sustainability and Green Buildings.

UNIT-II

General requirements: Requirements for safety against fire, termite, damping, earthquakes, Vertical transportation in building — planning of vertical transportation, Stairs, different forms of stairs, Other modes of vertical transportation.

UNIT-III

Special Requirements: Air conditioning — process and classification of air conditioning, Dehumidification. Systems of air-conditioning, ventilation, functional requirements of ventilation. Thermal insulation. Acoustics, effect of noise, properties of noise and its measurements, Principles of acoustics of building. Sound insulation.

UNIT-IV

Prefabrication systems: Prefabricated walls, openings, cupboards, shelves etc., planning and modules and sizes of components in prefabrication. Plumbing services — water supply system, maintenance of building pipe line, Sanitary fittings, Design of building drainage.

UNIT-V

Construction Equipment: Introduction and Planning for construction Equipment, Earthmoving and Excavating equipment, Pile driving equipment, Lifting and Concreting

Equipment.

Learning Resources:

Text Books:

1. Building Construction, Punmia B. C., Jain A.J., and Jain A.J., Laxmi Publication, 2016, Eleventh Edition.
2. The Text book for Building Construction, Arora S. P., and Bindra S. P., Dhanpat Rai Pubications, 2010.

Reference Books:

1. Building Construction, Varghese P.C., PHI Learning Pvt. Ltd., 2017, 2nd Edition.
2. Construction Planning, Equipment and Methods, Robert P., Clifford J. S., and Aviad S., McGrawHiII Education, 2010

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(Common to All Branches)

Open Elective Course- IV

Course Code	**Environmental Impact Assessment**	**L**	**T**	**P**	**C**
20A70105		**3**	**0**	**0**	**3**
	Semester	**VII**			

Course Objectives:
1. To impart knowledge on different concepts of Environmental Impact Assessment.
2. To teach procedures of risk assessment.
3. To teach the EIA methodologies and the criterion for selection of EIA methods.
4. To teach the procedures for environmental clearances and audit.
5. To know the impact quantification of various projects on the environment.

Course Outcomes (CO):
1. Prepare EMP, EIS, and EIA report.
2. Identify the risks and impacts of a project.
3. Choose an appropriate EIA methodology.
4. Evaluation the EIA report.
5. Estimate the cost benefit ratio of a project.

UNIT - I

Concepts and methodologies of EIA : Initial environmental Examination, Elements of EIA, - Factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters- Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT - II

Impact of Developmental Activities and Land Use :Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT - III

Assessment of Impact on Vegetation, Wildlife and Risk Assessment :Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation - Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-Advantages of Environmental Risk Assessment

UNIT - IV Environmental audit

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT - V Environmental Acts and Notifications

The Environmental protection Act, The water preservation Act, The Air (Prevention & Control of pollution Act), Wild life Act - Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- Evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000.

Textbooks:

1. Environmental Impact Assessment, by Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B. S. Publication, Hyderabad 2nd edition 2011

Reference Books:

1. Environmental Engineering, by Peavy, H. S, Rowe, D. R, Tchobanoglous, G.Mc-Graw Hill International Editions, New York 1985
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke, Prentice Hall Publishers
3. Environmental Science and Engineering, by Suresh K. Dhaneja, S.K., Katania& Sons Publication, New Delhi.
4. Environmental Pollution and Control, by H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi.

Online Learning Resources:

https://nptel.ac.in/courses/124107160

Course Code	Skills on STAAD PRO	L	T	P	C
20A70106		1	0	2	2
	Semester	VII			

Course Objectives:

1. To teach the students to understand the details of STAAD.Pro software package
2. To enable the students to prepare input data for RCC & Steel structures
3. To enable the students to design different components of structures
4. Students will learn the details of STAAD.Pro software package and know the behaviour of RCC and Steel structures.
5. Students will understand the bending moment diagram, drawn in tension face and shear force diagram

Course Outcomes (CO):

At the end of the course, the student will be able to

1. Understand the details of STAAD.Pro software package
2. To prepare input data of STAAD.Pro.
3. Run STAAD.Pro for analysis and desing of structures
4. Design different components of structures
5. Expertise in functionalities like model generation and editing; loading analysis; concrete designing etc.

List of Experiments:

1. Analysis & Design of 2D Frame under pure Vertical loading using Staad Pro Software.
2. Analysis & Design of 2D Frame under both Vertical & Horizontal loading using Staad Pro Software.
3. Analysis & Design of 2D Truss using Staad Pro Software.
4. Analysis & Design of 3D Frames using Staad Pro Software.
5. Analysis & Design of Different types of Beams Using Staad Pro Software.
6. Analysis & Design of Rectangular & Circular Columns Using Staad Pro Software.
7. Analysis & Design of Isolated Footings Using Staad Pro Software.
8. Analysis & Design of Retaining Walls Using Staad Pro Software.
9. Analysis & Design of One Way and Two Way Slabs Using Staad Pro Software.
10. Analysis & Design of Simple Tower by Using Staad Pro Software.

Textbooks

Staad Pro V8i for Beginners:With Indian Examples by T.S.Sarma,Notion Press Media Pvt Ltd

Online Learning Resources/Virtual Labs:

HONORS DEGREE IN STRUCTURAL ENGINEERING

Course Code	Cost Effective Housing Techniques	L	T	P	C
20A01H11		3	1	0	4
	Semester				

Course Objectives:

1. To understand the requirements of structural safety for future construction.
2. To know about the housing scenario, housing financial systems land use and physical planning for housing and housing the urban poor
3. To know the traditional practices of rural housing
4. To know the different innovative cost effective construction techniques
5. To know the alternative building materials for low cost housing.

Course Outcomes (CO):

1. Apply the concept of housing techniques and Understand housing programmes and projects
2. Understand development and adoption of low cost housing technology
3. Understand the Alternative building materials for low cost housing
4. Understand low cost housing in rural areas
5. Understand housing in disaster prone areas

UNIT - I

a) **Housing Scenario :**Introducing - Status of urban housing - Status of Rural Housing
b) **Housing Finance**: Introducing - Existing finance system in India - Government role as facilitator - Status at Rural Housing Finance - Impedimently in housing finance and related issues
c) **Land use and physical planning for housing :**Introduction - Planning of urban land - Urban land ceiling and regulation act - Efficiency of building bye lass - Residential Densities
d) **Housing the urban poor :**Introduction - Living conditions in slums - Approaches and strategies for housing urban poor

UNIT - II

Development and adoption of low cost housing technology

Introduction - Adoption of innovative cost effective construction techniques - Adoption of precast elements in partial prefatroices - Adopting of total prefactcation of mass housing in India- General remarks on pre cast rooting/flooring systems -Economical wall system - Single Brick thick loading bearing wall - 19cm thick load bearing masonry walls - Half brick thick load bearing wall – Fly-ash gypsum thick for masonry - Stone Block masonry - Adoption of precast R.C. plank and join system for roof/floor in the building

UNIT - III

Alternative building materials for low cost housing

Introduction - Substitute for scarce materials – Ferro-cement - Gypsum boards - Timber substitutions - Industrial wastes - Agricultural wastes - alternative building maintenance

Low cost Infrastructure services:

Introduce - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy

UNIT - IV

Rural Housing: Introduction traditional practice of rural housing continuous - Mud Housing technology Mud roofs - Characteristics of mud - Fire treatment for thatch roof - Soil stabilization - Rural Housing programs

UNIT - V

Housing in Disaster prone areas:

Introduction – Earthquake - Damages to houses - Traditional prone areas - Type of Damages and Railways of non-engineered buildings - Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions. Requirement's of structural safety of thin precast roofing units against Earthquake forces Status of R& D in earthquake strengthening measures - Floods, cyclone, future safety

Textbooks:

1. Building materials for low – income houses – International council for building research studies and documentation.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Low cost Housing – G.C. Mathur by South Asia Books

Reference Books:

1. Properties of concrete – Neville A.m. Pitman Publishing Limited, London.
2. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963.
3. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Rama chandra Murthy &G.Annamalai. E. & F. N. Spon Publishers

Online Learning Resources:

https://nptel.ac.in/courses/124107001

Course Code	Pre Engineered Buildings	L	T	P	C
20A01H12		3	1	0	4

Semester

CO1	Understand the basics about prefabrication
CO2	Classify different design loads on pre-engineered buildings
CO3	Understand the behaviour of structural components and joints
CO4	Understand the production technology
CO5	Apply pre-engineered building design methodology

Unit – I

Need for prefabrication: General Principles of Prefabrication - Comparison with monolithicconstruction, types of prefabrication, site and plant prefabrication, economy of prefabrication,modular coordination, standardization – Materials – Modular coordination – Systems –Production – Transportation – Erection.

Unit – II

Prefabricated Load Carrying Members: Planning for components of prefabricatedstructures, disuniting of structures, design of simple rectangular beams and I-beams,handling and erection stresses, elimination of erection stresses, beams, columns, symmetricframes.

Unit - III

Behaviour of structural components: Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls.

Joints: Joints for different structural connections, effective sealing of joints for waterproofing, provisions for non-structural fastenings, expansion joints in precast construction.

Unit- IV

Production Technology: Choice of production setup, manufacturing methods, stationaryand mobile production, planning of production setup, storage of precast elements,dimensional tolerances, acceleration of concrete hardening. Hoisting Technology -Equipment for hoisting and erection, techniques for erection of different types of memberslike beams, slabs, wall panels and columns, vacuum lifting pads.

Unit – V

Applications: Designing and detailing of precast unit for factory structures, purlins, principalrafters, roof trusses, lattice girders, gable frames, singe span single storied simple frames,single storied buildings, slabs, beams and columns.

Progressive collapse: Code provisions – Equivalent design loads for considering abnormaleffects such as earthquakes, cyclones, etc., - Importance of avoidance of progressivecollapse.

Text Books:

1. Introduction of Precast Factory, Vijayakandeeban, 2021.
2. Prefabricted Housing: Construction and Design Manual, Phillip Meuser, DOM Publishers, 2020.
3. CBRI, Building materials and components, India, 1990

Reference Books:

1. Knowledge based process planning for construction and manufacturing, Gerostiza C.Z., Hendrikson C. and Rehat D.R., Academic Press Inc., 1994.

2. Manual of precast concrete construction, Vols. I, II and III, Koncz T., Bauverlag, GMBH, 1971.
3. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978.
4. Prefabricated Concrete for Industrial and Public Structures, Mokk. L, Publishing House of the Hungarian Academy of Sciences, Budapest, 1964.

Online Resources:

https://www.youtube.com/watch?v=b9WQhnYq81s
https://nptel.ac.in/courses/124/105/124105013/

Course Code	Design of Bridges	L	T	P	C
20A01H13		3	1	0	4
	Semester				

CO1	**Familiarize with the usage of codal provisions in the design of bridges**
CO2	**Analyze and design various types of bridges like T-Beam bridge, Slab bridge, box culvert.**
CO3	**Analyze and design of plate girder bridge**
CO4	**Analyze and design substructure elements of bridges**

UNIT - I

INTRODUCTION: Importance of site investigation in Bridge design. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.

BOX CULVERT : General aspects. Design loads, Design of Box culvert subjected to IRC class AA tracked vehicle only.

BRIDGE BEARINGS : General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.

UNIT - II

DECK SLAB BRIDGE : Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only.

UNIT - III

BEAM & SLAB BRIDGE (T-BEAM BRIDGE) : General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

UNIT – IV

PLATE GIRDER BRIDGE : Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.

UNIT V

PIERS & ABUTMENTS: General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design).

TEXT BOOKS :

1. Bridge Engineering by Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi.
2. Design of Bridges by N.Krishnam Raju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.
3. Relevant – IRC & Railway bridge Codes.

REFERENCE :-

1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Design of Bridges Structure by D.J.Victor
3. Design of Steel structures by Ramachandra.
4. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
5. Design of Bridges Structure by T.R.Jagadish&M.A.Jayaram Prentice Hall of India Pvt., Delhi.

Course Code	CONSTRUCTION ECONOMICS AND	L	T	P	C
20A01H14	FINANCE	3	1	0	4

Semester

Course Objectives:

1. The market structures and integration concepts
2. To study the role & methods of economics & finance concepts applied to construction business.
3. Acquire knowledge of economics to facilitate the process of economic decision making
4. Acquire knowledge on basic financial management aspects
5. Develop the skills to analyze financial statements

Course Outcomes (CO):

1. Evaluate the economic theories, cost concepts and pricing policies
2. Apply Systematic evaluation of cost and benefit associated with different projects.
3. Apply the concepts of financial management for project appraisal
4. Understand accounting systems and analyze financial statements
5. Understand the impact of economic investment and project-management techniques

UNIT - I

Economics- Role of Civil Engineering in Industrial Development-Advances in Civil Engineering and engineering economics- Support matters of Economy as related top Engineering-Market demand and supply-Choice of technology- Quality control and Quality Production-Audit in economic law of returns governing production

UNIT - II

Construction of economics- Construction development in housing, Transport and other infrastructures-Economics of Ecology, environment, energy resources-Local material selection - Form and Functional designs-Construction workers- Urban problems - Poverty-Migration-Unemployment-pollution.

UNIT - III

Basics of accounting -cash basis of accounting- accrual basis of accounting. Final accounts-trading, profit and loss account-balance sheet. Analysis of financial statement - ratio analysis- Dupont chart - trend analysis-common size statement- cash flow analysis. Completed contract method -percentage completion method.

UNIT - IV

Long term sources of financing-Equity -debenture- long term loan - preference share -- venture capital - leasing. Short term sources of fund -- money market instruments - certificate of deposit - cash credit - repurchase agreement - treasury bill - commercial paper .

UNIT - V

Important decision of finance - investment decision -capital budget technique - procurement decision - dividend policy decision. Cost of capital.

Textbooks:

1. Projects - Planning Analysis Selection Implementation & Review by Prasanna Chandra, Tata McGrawHill Publishing Co., Ltd, New Delhi.
2. Fundamental of Construction Management and Organization by Kwaku A., Tenah

and Jose M .Guevera, Prentice Hall of India

Reference Books:

1. Financial and cost concepts for construction Management by Halpin, D.W., John Wiley & Sons, New York,
2. Introduction to Financial Management by Madura J. and Veit, E.T., West PublishingCo.
3. Construction Economics: An Introduction (Building & Surveying Series), by Stephen L. Gruneberg Palgrave Macmillan.

Online Learning Resources:

https://nptel.ac.in/courses/105103023

MINORS

Course Code	Building Material and Construction	L	T	P	C
20A01M11		3	1	0	4
	Semester				

Course Outcomes (CO):

On Completion of the course, the students will be able to:

1 Identify and characterize the properties of various building materials.
2 Understand the modern building materials, properties and their uses
3 Understand the importance of insulating materials in building construction.
4 Understand the importance of building structural components and its services.
5 Understand the principles and methods of construction in building components

UNIT – I

INTRODUCTION TO BUILDING MATERIALS

Traditional& OrganicBuilding Materials –Stone–Dressingof Stones– Modern Building Materials – Bricks – Manufacturing process – Ceramic Products – Manufacturing Process –Building Materials for Low Cost Housing – Utilisation of Wastes for Alternative Building Materials –Sustainable Materials in Construction, Concepts of energy efficient building envelopes as per ECBC – National Standards.

UNIT - II

GLASS: Introduction to Fenestration- Functions of Glass in Buildings – Constituents and Classification of Glass – Manufacturing Process –Properties of Glass – Common Types of Glass – Special Glass – Advantages and Disadvantages of Glass – National Standards such as ECBC.

PLASTIC: Introduction – Polymerisation – Classification of Plastics– Commonly Used Plastics – Moulding and Fabricating for Plastic Products – Applications – Advantages – Disadvantages – Intelligent Use of Plastics in Buildings – National Standards such as ECBC.

UNIT – III :

INSULATING MATERIALS : Thermal Insulating Materials: Introduction – Thermal Insulation – Heat Transfer Fundamentals – Thermal Properties of Insulating Materials – Selection of Insulating Materials – Classification of Insulation materials – Reflective Insulation Systems – Commonly Used Building Insulation Materials – Insulation that Should not be Used – National Standards such as ECBC.

Sound Insulating Materials: Introduction – Basics of Acoustics – Sound Absorption or Insulation – Green Insulation – Cool Roof, Green Roof, Power Roof – National Standards such as ECBC

UNIT - IV

STRUCTURAL COMPONENTS:–

Foundations – classification of Foundations – consideration in selection of foundation types– Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars – Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures – Components – Construction Procedure – Panel walls – National Standards such as ECBC.

UNIT - V

INTERNAL CONSTRUCTION AND FINISHES

Internal elements – Internal walls – Construction joints – Internal walls, fire protection –separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door sets – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of Paints – Types of Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints –Emulsion Paints – Whitewash and Colourwash – Application of Paints –Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards such as ECBC

Textbooks:

6. Building Material by S K Duggal – New Age International Publishers; Second Edition
7. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
8. A Textbook on Building Construction by S.K.Sharma, S.ChandPubilishers.
9. Building Materials by M.L.Gambhir, TMH Pubilishers.
10. ECBC (Energy Conservation Building Code).

Reference Books:

7. Building construction by W.B.Mckay, Vol.I, II, III & IV Pearson Publications, 2013 edition.
8. R.Chudly "Construction Technology" VolumesI and II" 2nd Edition, Longman, UK, 1987.
9. Building materials by S.C.Rangawala, CharotarPubilishing House, Anand- INDIA.
10. Building Construction by S.C.Rangawala, CharotarPubilishing House, Anand- INDIA
11. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
12. BEE (Bureau of Energy Efficiency) Manuals on Energy efficient building envelope concepts.

		L	T	P	C
Course Code	**BUILDING PLANNING AND**				
20A01M12	**DRAWING**	**3**	**1**	**0**	**4**
	Semester				

Course Objectives:

1. Understand basic principles of building design and planning.
2. Comprehend local building bye-laws and provisions of National Building Code in respect of building and town planning
3. They will explore building drawing as a way of discovering and developing ideas for designing residential , commercial and public buildings.
4. The student develops basic drawing skills; create multilayer architectural and prepare working drawings, foundation plans and other executable drawings with proper details for residential buildings
5. Explain the principles of planning and design considerations to construct earthquake resistant building

Course Outcomes (CO):

1. Apply the principles and bye-laws in planning Residential buildings
2. Understand the planning of residential building & public building
3. Understand the safety and comforts in building .
4. Interpret the symbols, signs and conventions from the given drawing.
5. Draw a line sketch and planning and bi section of a building .

UNIT - I **PART - A**

PLANING OF BUILDINGS: Types of buildings, Types of residential buildings, site selection for residential building, orientation of buildings; aspect; prospect; privacy; furniture requirement
e;grouping;circulation;sanitation;lighting;ventilation;cleanliness;flexibility;elegancy;Economy; practical considerations.

BUILDING BYELAWS AND REGULATIONS: Introduction- Terminology ;Objectives of building byelaws; Minimum plot sizes; Open space requirements ;Plinth area, floor area, carpet area; Floor area ratio (FAR), Floor space Index (FSI) ;areas for different units; Principles underlying building byelaws ; built up area limitations – Height of Buildings ,Wall thickness, lighting and ventilation requirement, safety from fire, drainage and sanitation; applicability of the bye-laws.

UNIT - II

PLANNING OF RESIDENTIAL BUILDINGS: Minimum standards for various parts of buildings– Requirements of different rooms and their grouping – Characteristics of various types of residential buildings

PLANNING OF PUBLIC BUILDING: Planning of Educational institutions, Hospitals, Office buildings, Banks, Industrial buildings, Hotels and Motels, Hostels, Bus Station.

UNIT - III

BUILDINGS: SAFETY AND COMFORT: Aspects of safety-Structural, health, fire and constructional safety. Components of building automation system - HVAC, electrical lighting, Security, fire-fighting, communication etc. design for thermal comfort, ventilation comfort, air conditioning comfort, lighting comfort, noise and acoustic comfort.

UNIT - IV **PART - B**

SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, and white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond; odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

DOORS WINDOWS, VENTILATORS AND ROOFS: Paneled Door – Paneled and glazed door; glazed windows – Paneled windows; Swing ventilator – Fixed ventilator; Couple roof – Collar roof; Kind Post truss – Queen post truss.

UNIT - V

Given line diagram with specification to draw plan, section and elevation of the following :

1. Residential Building
2. Hospital
3. Schools
4. Post office
5. Corporate Office Building
6. Hotels
7. Bank buildings
8. Bus stations
9. Industrial buildings

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part-A and Part-B. Part- A consists of three questions with either or choice from three units in planning portion .Each question carries 10 marks. Total marks for Part-A is 30 marks. Part- B consists of two questions with either or choice from drawing portion. Question from unit-IV carries 10 marks and question from unit-V carries 30 marks. Total marks for Part-B is 40 marks.

Textbooks:

1. Planning and Designing and Scheduling – Gurucharan Singh and Jagadish Singh-Standard publishers.
2. Building Planning and Design – N.Kumara Swamy and A.Kameswara Rao. Charotar publications.

Reference Books:

1. Building by laws by state and Central Governments and Municipal corporations. National Building Code.
2. Building drawing with an integrated approach to building environment-M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc Graw Hill

Subject Code	Title of the Subject	L	T	P	C
20A01M13	**ESTIMATION, COSTING AND VALUATION**	3	1	0	4

COURSE OBJECTIVES:

The objectives of this course are:

1. To impart basic knowledge on different types of estimation
2. To enrich with specifications and tender procedures.
3. To give insights on various types of contract agreements.
4. To inculcate data preparation for abstract estimation
5. To teach procedure for valuation of buildings.

COURSE OUTCOMES

On Completion of the course, the students will be able to:

1.	Understand basics on methods and types of estimation.
2.	Formulate specifications and tender documents
3.	Prepare contract agreements
4.	Determine rate analysis of different items.
5.	Understand the Valuation of buildings.

UNIT -I:

Estimation : Methods of estimation-advantages-types of estimates-Detailed estimates of residential buildings-Single storied and multi-storied buildings-Earthwork-foundations-Super structure-Fittings including sanitary and electrical fittings-Paintings.

UNIT -II:

Specifications and Tenders : Specifications-Detailed and general specifications-Construction specifications-sources - Types of specifications-Tender notices-types-corrigendum notice-Tender procedures Drafting model tenders.

UNIT -III:

Contracts : Types of contracts-Formation and conditions of contract-Problems-contract for labor, material, design and construction-Drafting of contract documents-Construction contracts- Arbitration and legal requirements.

UNIT -IV:

Rate Analysis and Preparation of Bills : Data-Rate analysis-abstract estimate-Report to accompany estimate-measurement book –Bills-Types.

UNIT -V:

Valuation : Principles of valuation-Value and Cost-Value engineering-Value analysis-Phases in value engineering-Information-Function-escalation-Evaluation-Recommendation-Implementation-Audit.

TEXT BOOKS:

3. Dutta, B. N., “Estimating and Costing in Civil Engineering (Theory & Practice)”, UBS Publishers, 2016
4. B. S. Patil, “Civil Engineering Contracts and Estimates”, Universities Press Pvt Ltd, Hyderabad. 4th Edition 2015.

REFERENCES:

4. M. Chakraborthi, “Estimation, Costing and Specifications”, Laxmi publications.
5. D. D. Kohli & R. C. Kohli, “A Textbook of Estimating and Costing(Civil)”, S. Chand and Company Limited, New Delhi
6. Standard Schedule of rates and standard data book by public works department.
7. I. S. 1200 (Parts I to XXV, “Method of Measurement of Building and Civil Engineering works – B.I.S.)” 1974.

Course Code	SURVEYING	L	T	P	C
20A1M14		3	1	0	4

Semester

Course Objectives:

1. To make the student to get well conversant with the fundamentals of various basic methods and instruments of surveying.
2. To introduce to the students in identifying reduced level of the ground and its profile for finding areas and volumes of embankments and cuttings
3. To make the student to use angular measuring instruments for horizontal and vertical control.
4. To enable the student to set simple horizontal curves
5. To introduce the knowledge construction surveys and usage of modern instrument such as total station

Course Outcomes (CO):

1	Conversant with the fundamentals of various basic methods and instruments of surveying.
2	Understand the techniques in Plane table surveying and Leveling
3	Identify reduced level of the ground and its profile for finding areas and volumes of embankments and cuttings
4	Understand the working principles of survey instruments
5	Understand the tacheometry surveying and setting out of simple horizontal circular curves

UNIT - I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying. Measurement of Distances and Directions Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, indirect methods- optical methods- E.D.M. method.Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip.

Plane table surveying: Introduction, accessories, setting up of plane table, techniques, testing, adjustments, errors, advantages and disadvantages.

UNIT - II

Levelling - Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes: Areas - Determination of areas consisting of irregular boundary and regular boundary, Planimeter. Volumes - Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.
Traversing: Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

UNIT - IV
Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry.
Curves: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves.

UNIT - V
Construction surveys: Introduction-staking out buildings-Pipelines and sewers-Highways-Culverts. Bridge surveys-Determining the length of a bridge-Locating Centres of piers-Surface surveys and tunnel alignment-Underground surveys-connection of surface and underground surveys-Leveling in tunnels.
Total station Surveying: Basic principles, applications, comparison with conventional surveying. Electromagnetic wave theory - Electromagnetic distance measuring system - Principle of working and EDM instruments.

Textbooks:

1. Text book of surveying by C.Venkatramaiah , Universities press,2nd edition2018
2. Surveying" (Vol – 1 & 2), by S K Duggal, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.

Reference Books:

7. Surveying Vol 1, 2 &3, by Arora K R Standard Book House, Delhi, 2004.
8. Surveying (Vol – 1, 2 & 3) by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
9. Higher Surveying by Chandra A M, New age International Pvt. Ltd., Publishers, New Delhi, 2002.

Online Learning Resources:
https://nptel.ac.in/courses/105104101

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – I Civil

III B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Course Code	Experimental Stress Analysis	L	T	P	C
20A50105		3	0	0	3
	Semester	V			

Course Objectives:

6. To understand different methods of experimental stress analysis
7. To understand the use of strain gauges for measurement of strain
8. To be exposed to different Non destructive methods of concrete
9. To understand the theory of photo elasticity and its applications in analysis of structures
10. To understand different methods of photo elasticity

Course Outcomes (CO):

6. Understand different methods of experimental stress analysis
7. Understand the use of strain gauges for measurement of strain
8. Expose to different Non destructive methods of concrete
9. Understand the theory of photo elasticity and its applications in analysis of structures
10. Understand different methods of photo elasticity

UNIT - I

PRINCIPLES OF EXPERIMENTAL APPROACH:Merits of Experimental Analysis Introduction, uses of experimental stress analysisAdvantages of experimental stress analysis, Different methods –Simplification of problems.

UNIT - II

STRAIN MEASUREMENT USING STRAIN GAUGES :Definition of strain and its relation of experimental Determinations Properties of Strain-

Gauge Systems-Types of Strain Gauges –Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – Various types –Gauge factor – Materials of adhesion base.

UNIT - III

STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE: Introduction – The three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge.

Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.

UNIT - IV

THEORY OF PHOTOELASTICITY: Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polar scope for various arrangements – Fringe Sharpening. Brewster's Stress Optic law.

UNIT - V

TWO DIMENSIONAL PHOTOELASTICITY:Introduction – Isochramic Fringe patterns-Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

Textbooks:

3. Experimental stress analysis by J.W.Dally and W.F.Riley, College House Enterprises2005
4. Experimental stress analysis by Dr.SadhuSingh.khanna Publishers 4th edition

Reference Books:

3. Experimental Stress analysis by U.C.Jindal, Pearson Pubilications 2012 edition
4. Experimental Stress Analysis by L.S.Srinath, MC.Graw Hill Company Publishers.

Online Learning Resources:

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – I EEE

III B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Course Code	ELECTRIC VEHICLE ENGINEERING (OE-I) EEE		L	T	P	C
20A50205			3	0	0	3
Pre-requisite	AC & DC Machines	Semester	V			

Course Objectives: The student will be able to:

- Understand latest trends in Electric Vehicles; parameters used in EV and types of EVs.
- Analyze various energy sources available to run EV like batteries, fuels cells etc.
- Analyze the dynamics and the propulsion system used in EVs, working of fuel cells, battery charging concept.
- Design a electromechanical system using various control techniques.

Course Outcomes (CO): At the end of the course, the student will be able to:

CO1: Understand the difference between conventional and latest trends in Electric Vehicles; understand the various parameters used in EV, types of HEVs.

CO2: Analyze various energy sources available to run EV like batteries, fuels cells etc.

CO3: Analyze the propulsion system of EV, its dynamics and the concept of battery charging.

CO4: Design EV system with battery charger using various fundamental concepts.

UNIT - I	INTRODUCTION TO EV SYSTEMS AND PARAMETERS	Lecture Hrs: 10

Past, Present and Future EV, EV Concept, EV Technology, State-of-the Art EVs, EV configuration, EV system, Fixed and Variable gearing, single and multiple motor drive, in-wheel drives, EV parameters: Weight, size, force and energy, performance parameters.

UNIT - II	EV AND ENERGY SOURCES	Lecture Hrs: 08

Electro mobility and the environment, history of Electric power trains, carbon emissions from fuels, green houses and pollutants, comparison of conventional, battery, hybrid and fuel cell electric systems

UNIT - III	EV PROPULSION AND DYNAMICS	Lecture Hrs: 10
Choice of electric propulsion system, block diagram, concept of EV Motors, single and multi motor configurations, fixed and variable geared transmission, In-wheel motor configuration, classification, Electric motors used in current vehicle applications, Recent EV Motors, Vehicle load factors, vehicle acceleration.		
UNIT - IV	**FUEL CELLS**	**Lecture Hrs: 10**
Introduction of fuel cells, basic operation, model, voltage, power and efficiency, power plant system – characteristics, sizing, Example of fuel cell electric vehicle. Introduction to HEV, brake specific fuel consumption, comparison of series, series-parallel hybrid systems, examples		
UNIT - V	**BATTERY CHARGING AND VEHICLE CONTROL**	**Lecture Hrs: 10**
Battery charging: Battery Chemistry, Basic requirements, charger architecture, charger functions, wireless charging, power factor correction. **Battery Management System:** Introduction and BMS functionality, Battery pack topology, Voltage, Temperature and Current Sensing. **Control:** Introduction, modelling of electro mechanical system, feedback controller design approach, PI controllers designing, torque-loop, speed control loop compensation, acceleration of battery electric vehicle		
Textbooks:C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University Press Inc., New York 2001. 1. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.		
Reference Books:		
1. Electric and Hybrid Vehicles Design Fundamentals, Iqbal Husain, CRC Press 2005. 2. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 2015. 3. Tom Denton, “Electric and Hybrid Vehicles”, TAYLOR & FRANCIS; 2nd edition, CBS PUBLISHERS, 2nd Edition, 2020. 4. MehrdadEhsani, Yimin Gao, Ali Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals”, CRC Press, 2010. 5. Bergveld, H.J., Kruijt, W.S., Notten, P.H.L “Battery Management Systems -Design by Modelling” Philips Research Book Series 2002.		
Online Learning Resources:		
1. https://onlinecourses.nptel.ac.in/noc22_ee53/preview		

Open Elective Course – I Mechanical

III B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Subject Code	Title of the Subject	L	T	P	C
2050305	**OPTIMIZATION TECHNIQUES**	3	0	0	3

Course Objectives:

To introduce various optimization techniques i.e classical, linear programming,

Transportation problem, simplex algorithm, dynamic programming
Constrained and unconstrained optimization techniques for solving and optimizing.

Electrical and electronic engineering circuits design problems in real world situations.

To explain the concept of Dynamic programming and its applications to project

Learn the knowledge to formulate optimization problems

UNIT - I

Classical optimization techniques: Single variable optimization with and without constraints, multi – variable optimization without constraints, multi – variable optimization with constraints– method of Lagrange multipliers, Kuhn-Tucker conditions.

UNIT - II

Numerical methods for optimization: Nelder Mead's Simplex search method, Gradient of a function, Steepest descent method, Newton's method, types of penalty methods for handling constraints.

UNIT - III

Genetic algorithm (GA) : Differences and similarities between conventional and evolutionary algorithms, working principle, reproduction, crossover, mutation, termination criteria, different reproduction and crossover operators, GA for constrained optimization, draw backs of GA,

Multi-Objective GA: Pareto's analysis, Non-dominated front, multi – objective GA, Non-dominated sorted GA, convergence criterion, applications of multi-objective problems

UNIT – IV

Genetic Programming (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

UNIT V

Applications of Optimization in Design and Manufacturing systems: Some typical applications like optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam and general optimization model of a machining process.

Course Outcomes:

After completion of this course, the student will be able to explain the need of optimization of engineering systems

understand optimization of electrical and electronics engineering problems

apply classical optimization techniques, linear programming, simplex algorithm,

- transportation problem apply unconstrained optimization and constrained non-linear programming anddynamic programming Formulate optimization problems.

TEXT BOOKS:

Optimal design – Jasbir Arora, Mc Graw Hill (International) Publishers

Optimization for Engineering Design – Kalyanmoy Deb, PHI Publishers

Engineering Optimization – S.S.Rao, New Age Publishers

REFERENCES:

1.Genetic algorithms in Search, Optimization, and Machine learning – D.E.Goldberg, Addison-Wesley Publishers

Genetic Programming- Koza

Multi objective Genetic algorithms - Kalyanmoy Deb, PHI Publishers

Open Elective Course – I ECE

III B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Course Code	BASICS OF ELECTRONICS AND COMMUNICATION	L	T	P	C
20A50405	ENGINEERING	3	0	0	3
	Semester	V			

Pre-requisite

Applied Physics

Course Objectives:

- To study the basic principle, construction and operation of semiconductor devices.
- To learn the real time applications of semiconductor devices.
- To introduce binary number systems, logic gates and digital logic circuits.
- To get an idea about the basic principles of communication systems and their applications.
- To learn the measurement of physical parameters using Sensors and Transducers.

Course Outcomes (CO): At the end of this course, the students will be able to

- Understand the basic principle, construction and operation of semiconductor devices.
- Learn the real time applications of semiconductor devices.
- Comprehend the binary number systems, logic gates and digital logic circuits.
- Understand the basic principles of communication systems and their applications.
- Measure the physical parameters using Sensors and Transducers.

UNIT - I

Introduction to Electronics Engineering: Overview, scope and objective of studying Electronics Engineering. Introduction to semiconductor devices: Bond structure of semiconductors, intrinsic and extrinsic semiconductors; Basic principle and operation of semiconductor devices – diode, bipolar junction transistor, field effect transistors; Introduction to VLSI.

UNIT - II

Applications of semiconductor devices: Basic concepts of rectifiers, voltage regulators, amplifiers and oscillators; Basic concepts of operational amplifier and their applications.

UNIT - III

Introduction to digital systems: Binary number system, Boolean algebra, Logic gates, adders, one-bit memory, flip-flops (SR, JK), shift registers, Asynchronous counter.

UNIT - IV

Introduction to Communication Systems: Elements of a communication system – transmitter and receiver; Signal types in communication; FDM and TDM; Processing of signals for transmission – basic concepts of amplitude and frequency modulation; Examples of telecommunication systems – telephone, radio, television, mobile communication and satellite communication.

UNIT - V

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Textbooks:

1. Millman J, Halkias C.C and Jit S, “Electronic Devices and Circuits”, Tata McGraw-Hill, 2nd 2007 Edition.
2. Mano M.M., “Digital Design”, Prentice-Hall, 3rd Edition. 2002
3. A.K. Sawhney, “A course in Electrical and Electronics Measurements and Instrumentation”, DhanpatRai& Co. 3rd edition Delhi, 2010.
4. Kennedy G. and Davis B., “Electronic Communication Systems”, Tata McGraw-Hill, 4th 2008 Edition.

Reference Books:

1. Tomasi W., “Advanced Electronic Communication Systems”, Pearson/Prentice-Hall, 6th 2004 Edition.
2. Boylstead R.L. and Nashelsky L., “Electronic Devices and Circuit Theory”, Pearson, 10th 2009 Edition.

Online Learning Resources:

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – I CSE

III B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

INTRODUCTION TO JAVA PROGRAMMING

Course Code:20A50505 Semester V(R20) L T P C : 3 0 0 3

Course Objectives:

- To understand object-oriented concepts and problem-solving techniques
- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
- To design the GUIs using applets and swing controls.
- To understand the Java Database Connectivity Architecture

Course Outcomes:

CO1: Solve real-world problems using OOP techniques.
CO2: Apply code reusability through inheritance, packages and interfaces
CO3: Solve problems using java collection framework and I/O classes.
CO4: Develop applications by using parallel streams for better performance and develop applets for web applications.
CO5: Build GUIs and handle events generated by user interactions and Use the JDBC API to access the database.

UNIT – I: **Introduction**

Introduction to Object Oriented Programming, The History and Evolution of Java, Introduction to Classes, Objects, Methods, Constructors, this keyword, Garbage Collection, Data Types, Variables, Type Conversion and Casting, Arrays, Operators, Control Statements, Method Overloading, Constructor Overloading, Parameter Passing, Recursion, String Class and String handling methods.

UNIT – II: **Inheritance, Packages, Interfaces**

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance, Object class,
Packages: Basics, Finding packages and CLASSPATH, Access Protection, Importing packages.
Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

UNIT – III: **Exception handling, Stream based I/O**

Exception handling - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception subclasses.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and Writing Files, Random access file operations, The Console class, Serialization, Enumerations, Autoboxing, Generics.

UNIT – IV: **Multithreading, The Collections Framework**

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Interthread communication.

The Collections Framework (java.util): Collections overview, Collection Interfaces, The Collectionclasses- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Hashtable, Properties, Stack, Vector, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner.

UNIT – V: **Applet, GUI Programming with Swings, Accessing Databases with JDBC**

Applet: Basics, Architecture, Applet Skeleton, requesting repainting, using the status window, passing parameters to applets

GUI Programming with Swings – The origin and design philosophy of swing, components and containers, layout managers, event handling, using a push button, jtextfield, jlabel and image icon, the swing buttons, jtext field, jscrollpane, jlist, jcombobox, trees, jtable, An overview of jmenubar, jmenu and jmenuitem, creating a main menu, show message dialog, show confirmdialog, show input dialog, show option dialog, jdialog, create a modeless dialog.

Accessing Databases with JDBC:

Types of Drivers, JDBC Architecture, JDBC classes and Interfaces, Basic steps in developing JDBC applications, Creating a new database and table with JDBC.

Textbooks:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.

2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

Reference Books:

1. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.
2. Core Java Volume – 1 Fundamentals, Cay S. Horstmann, Pearson Education.
3. Java Programming for core and advanced learners, Sagayaraj, Dennis, KarthikandGajalakshmi, University Press
4. Introduction to Java programming, Y. Daniel Liang, Pearson Education

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – I Chemical

III B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Course Code		L	T	P	C
20A50805	ENERGY CONVERSION AND STORAGE DEVICES	3	0	0	3

Pre-requisite

Course Objectives:

1. Understand the fundamentals of fossil energy sources, solar, biomass and electrochemical energy etc
2. Understand the basics of photosynthetic, photocatalytic and photoelectrochemical systems and devices for the efficient energy and fuels production.
3. Learn the principles and operations of electrochemical energy storage devices,

Course Outcomes (CO):

At the end of the course, the student will be able to:

CO1 Understand the need of energyconversion and the various methods of energy storage

CO2 Identify Winds energy as alternateform of energy and to know how itcan be tapped

CO3 Understand the nuclear and bio energy, its mechanism of production and its applications

CO4 Analyse chemical, electrochemical energy storage devices and interpret the conversion efficiencies

CO5 Explain bio gas generation and itsimpact on environment

Course Articulation Matrix

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												

UNIT - I

Outline of the course. Introduction and scope of energy conversion. World Energy Production and Balance. Motivations for studying future energy systems (e.g. pollution, climate change, energy security).

UNIT - II

Fossil Energy: Overview of fossil fuel resources and energy contents. Cycle analysis (Rankine, Brayton, combined cycles, cogeneration)

Nuclear Energy: nuclear reaction and energy conversion physics (fission and fusion), nuclear power systems

UNIT - III

Solar-thermal energy: solar thermal radiation physics, Active and passive solar-thermal energy collection and conversion systems

Photoelectric energy: Photoelectric physics. Solar photovoltaic cell materials and technology

Wind Energy: Wind interaction with objects fluid dynamics. Wind harvesting devices and systems

UNIT - IV

Biomass and Waste to Energy: Potential and resources of biomass and waste energy. Thermal-chemical and bio-chemical conversion methods

Overview of Climate Control, CO_2 Sequestration and Energy Sustainability

UNIT - V

Basic of Electrochemical energy conversion and storage, Fundamentals of Fuel Cells, Basics of

Fusion power, Energy Storage Technologies, Mechanical storage, Chemical storage, Electrical storage

Textbooks:

Energy Systems Engineering, F.M. Vanek, L.D Albright, and LargusAngenent, Second Edition, McGraw-Hill, Inc., 2012,

Reference Books:

- AngèleReinders, Pierre Verlinden, Wilfried van Sark, Alexandre Freundlich, Photovoltaic Solar Energy:From Fundamentals to Applications, JOHN WILEY.
- Alexander P. Kirk, Solar Photovoltaic Cells: Photons to Electricity, ELSEVIER
- Francesco Dalena, Angelo Basile, Claudio Rossi, Bioenergy Systems For The Future: Prospects ForBiofuels And Biohydrogen, 1st Edition, ELSEVIER
- Jean-Marie Tarascon, Patrice Simon, ELECTROCHEMICAL ENERGY STORAGE,
- Electrochemistry by Carl H. Hamann, Andrew Hamnett and Wolf Vielstich, Wiley VCH, 1998.
- Modern Electrochemistry 1. Volume 1 and 2, by J. O'M. Bockris and A. K. N. Reddy, Kluwer Academic,2000.
- Electrochemical Methods, by A. J. Bard and L. R. Faulkner, John Willey, 1980
- John Love and John A. Bryant, Biofuels and Bioenergy, John Wiley
- Anju Dahiya, Bioenergy: Biomass to Biofuels, Elsevier

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – I Mathematics

III B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Course Code	Optimization Methods		L	T	P	C
20A55101	B.Tech III Year (Common for all) Open elective course -1		0	3	0	3
Pre-requisite	--	Semester	I			

Course Objectives:

This course enables the students to classify and formulate real-life problem for modeling as optimization problem, solving and applying for decision making.

Course Outcomes (CO): Student will be able to

- formulate a linear programming problem and solve it by various methods.
- give an optimal solution in assignment jobs, give transportation of items from sources to destinations.
- identify strategies in a game for optimal profit.
- implement project planning.

UNIT - I		8 Hrs

Introduction to operational research-Linear programming problems (LPP)-Graphical method-Simplex method-Big M Method-Dual simplex method.

UNIT - II		8 Hrs

Transportation problems- assignment problems-Game theory.

UNIT - III		9 Hrs

CPM and PERT –Network diagram-Events and activities-Project Planning-Reducing critical events and activities-Critical path calculations.

UNIT - IV		8 Hrs

Sequencing Problems-Replacement problems-Capital equipment- Discounting costs-Group replacement .

UNIT - V		9 Hrs

Inventory models-various costs- Deterministic inventory models-Economic lot size-Stochastic inventory models- Single period inventory models with shortage cost.

Textbooks:

1. Operations Research , S.D. Sharma.
2. Operations Research, An Introduction, Hamdy A. Taha, Pearson publishers.
3. Operations Research, Nita H Shah, Ravi M Gor, HardikSoni, PHI publishers

Reference Books:

1. Problems on Operations Research, Er. Premkumargupta, Dr.D.S. Hira, Chand publishers 2. Operations Research, CB Gupta, PK Dwivedi, Sunil kumaryadav
Online Learning Resources:
https://nptel.ac.in/content/storage2/courses/105108127/pdf/Module_1/M1L2slides.pdf https://slideplayer.com/slide/7790901/ https://www.ime.unicamp.br/~andreani/MS515/capitulo12.pdf

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – I Physics

III B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Subject Code	Title of the Subject	L	T	P	C
20A55201	**MATERIALS CHARACTERIZATION TECHNIQUES**	3		-	3

COURSE OBJECTIVES	
1	To provide an exposure to different characterization techniques.
2	To explain the basic principles and analysis of different spectroscopic techniques.
3	To elucidate the basic principle of Scanning electron microscope along with its limitations and applications.
4	To identify the Resolving power and Magnification of Transmission electron microscope and its applications.
5	To educate the uses of advanced electric and magnetic instruments for characterization.
COURSE OUTCOMES	
At the end of the course the student will be able	
CO1	To explain the structural analysis by X-ray diffraction.
CO2	To understand the morphology of different materials using SEM and TEM.
CO3	To recognize basic principles of various spectroscopic techniques.
CO4	To apprehend the electric and magnetic properties of the materials.
CO5	To make out which technique has to be used to analyse a material

SYLLABUS

Credit: 3 **Hours of teaching: - 45 H**

UNIT-I **9H**

Structure analysis by Powder X-Ray Diffraction: Introduction, Bragg's law of diffraction, Intensity of Diffracted beams, Factors affecting Diffraction, Intensities, Structure of polycrystalline Aggregates, Determination of crystal structure,Crystallite size by Scherrer and Williamson-Hall (W-H) Methods, Small angle X-ray scattering (SAXS) (in brief).

UNIT-II **9H**

Microscopy technique -1 –Scanning Electron Microscopy (SEM)

Introduction, Principle, Construction and working principle of Scanning Electron Microscopy, Specimen preparation, Different types of modes used (SecondaryElectron and Backscatter Electron), Advantages, limitations and applications of SEM.

UNIT-III **9H**

Microscopy Technique -2 - Transmission Electron Microscopy (TEM): Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy,Difference between SEM and TEM, Advantage and Limitations of Transmission Electron Microscopy.

UNIT-IV **9H**

Spectroscopy techniques – Principle, Experimental arrangement, Analysis and advantages of the spectroscopic techniques – (i) UV-Visible spectroscopy(ii) Raman Spectroscopy, (iii) Fourier Transform infrared (FTIR) spectroscopy, (iv) X-ray photoelectron spectroscopy (XPS).

UNIT-V **9H**

Electrical & Magnetic Characterization techniques: Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method,Vibrating sample Magnetometer (VSM) and SQUID.

TEXT BOOKS:

1. Material Characterization: Introduction to Microscopic and Spectroscopic Methods – Yang

Leng – John Wiley & Sons (Asia) Pvt. Ltd. 2008

2. Hand book of Materials Characterization -by **Sharma** S. K. - S**pringer**

REFERENCES:

1. Fundamentals of Molecular Spectroscopy – IV Ed. – Colin Neville BanwellandElaine M.

McCash, Tata McGraw-Hill, 2008.

2. Elements of X-ray diffraction – Bernard Dennis Cullity& Stuart R Stocks, PrenticeHall, 2001 – Science

3. Materials Characterization: Introduction to Microscopic and Spectroscopic Methods-Yang

Leng- John Wiley & Sons

4. Characterization of Materials 2nd Edition, 3 Volumes-Kaufmann E N -John Wiley(Bp)

5. Microstructural Characterization of Materials - David Brandon, Wayne D Kalpan,John Wiley & Sons Ltd., 2008.

NPTEL courses

https://nptel.ac.in/courses/115/103/115103030/

https://nptel.ac.in/content/syllabus_pdf/113106034.pdf

https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-mm08/

Open Elective Course – I H & SS

III B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Course Code	E-Business	L	T	P	C
20A55401		3	0	0	3

Pre-requisite

Course Objectives:

1.	To provide knowledge on emerging concept on E-Business related aspect.
2.	To understand various electronic markets models which are trending in India
3.	To give detailed information about electronic payment systems net banking.
4.	To exact awareness on internet advertising, market research strategies and supply chain management.
5.	To understand about various internet protocols-security related concept.

Course Outcomes (CO):

1	They will be able to identify the priority of E-Commerce in the present globalised world.
2	Will be able to understand E-market-Models which are practicing by the organization
3.	Will be able to recognize various E-payment systems & importance of net banking.
4.	By knowing E-advertisement, market research strategies, they can identify the importance of customer role.
5.	By understanding about E-security, they can ensure better access control to secure the information
6	Develop a personal synthesis and approach towards E-Business

UNIT – I **Electronic Business**

Definition of Electronic Business - Functions of Electronic Commerce (EC) - Advantages of E-Commerce – E-Commerce and E-Business Internet Services Online Shopping-Commerce Opportunities for Industries.

LEARNING OUTCOMES:- After completion of this unit student will

- Understand the concept of E-Business
- Contrast and compare E-Commerce E-Business
- Analyze Advantages of E-Commerce
- Evaluate opportunities of E-commerce for industry

UNIT - II **Electronic Markets and Business Models**

E-Shops-E-Malls E-Groceries - Portals - Vertical Portals-Horizontal Portals - Advantages of Portals - Business Models-Business to Business(B2B)-Business to Customers(B2C)-Business to Government(B2G)-Auctions-B2B Portals in India

LEARNING OUTCOMES:- After completion of this unit student will

- Understand the concept of business models
- Contrast and compare Vertical portal and Horizontal portals
- Analyze Advantages of portals
- Explain the B2B,B2C and B2G model

UNIT - III **III Electronic Payment Systems**

Digital Payment Requirements-Designing E-payment System- Electronic Fund Transfer (EFT)-Electronic Data Interchange (EDT)-Credit Cards-Debit Cards-E-Cash-Electronic Cheques -Smart Cards-Net Banking-Digital Signature.

LEARNING OUTCOMES:- After completion of this unit student will

- Understand the Electronic payment system
- Contrast and compare EFT and EDT
- Analyze debit card and credit card
- Explain the on Digital signature

UNIT - IV **E-Security**

Internet Protocols - Security on the Internet –Network and Website Security – Firewalls – Encryption – Access Control – Secure Electronic transactions.

LEARNING OUTCOMES:- After completion of this unit student will

- Understand E-Security
- Contrast and compare security and network
- Analyze Encryption
- Evaluate electronic transitions

UNIT - V **E-Marketing**

Online Marketing – Advantages of Online Marketing – Internet Advertisement – Advertisement Methods – Conducting Online Online Market Research– Data mining and Marketing Research Marketing Strategy On the Web – E-Customer Relationship Management(e-CRM) –E- Supply Chain Management.(e-SCM) –New Trends in Supply Chain Management.

LEARNING OUTCOMES:- After completion of this unit student will

- Understand the concept of online marketing
- Analyze advantages of online marketing
- Compare the e-CRM and e-SCM
- Explain the New trends in supply chain management

Textbooks:

1. **E-Commerce by C.S.V Murthy** Himalaya publication house, 2002.
2. **E-Commerce by** P.T.S Joseph, Fourth Edition, Prentice Hall of India 2011

Reference Books:

1. **E-Commerce: by** KamaleshKBajaj,DebjaniNa, Second Edition TataMcGrwHills 2005
2. **E-Commerce E-Management: by Dave Chaffey** – Second Edition, Pearson, 2012.
3. **E-Commerce Fundamentals and Application; by** Henry Chan, Raymond Lee,Tharm Wiley India 2007
4. **E-Commerce: by** S. Jaiswall Galgotia Publication Pvt Ltd 2003.

Online Learning Resources:

Open Elective Course – I

III B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF CHEMISTRY

Subject Code	Title of the Subject	L	T	P	C
20A55301	**CHEMISTRY OF ENERGY MATERIALS**	2	1	-	3

COURSE OBJECTIVES	
1	To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.
2	To understand the basic concepts of processing and limitations of fossil fuels and Fuel cells & their applications.
3	To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquification method
4	Necessasity of harnessing alternate energy resources such as solar energy and its basic concepts.
5	To understand and apply the basics of calculations related to material and energy flow in the processes.

COURSE OUTCOMES	
CO1	Solve the problems based on electrode potential,Describe the Galvanic Cell Differentiate between Lead acid and Lithium ion batteries, Illustrate the electrical double layer
CO2	Describe the working Principle of Fuel cell,Explain the efficiency of the fuel cell Discuss about the Basic design of fuel cells,Classify the fuel cell
CO3	Differentiate Chemical and Physical methods of hydrogen storage,Discuss the metal organic frame work, Illustrate the carbon and metal oxide porous structures Describe the liquification methods
CO4	Apply the photo voltaic technology,Demonstrate about solar energy and prospects Illustrate the Solar cells,Discuss about concentrated solar power
CO5	Differentiate between Photo and Photo electrochemical Conversions,Illustrate the photochemical cells, Identify the applications of photochemical reactions, Interpret advantages of photoelectron catalytic conversion

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

UNIT-1: Electrochemical Systems: Galvanic cell, standard electrode potential, application of EMF, electrical double layer, dipole moments, polarization, Batteries-Lead-acid and Lithium ion batterie**s.-**

UNIT-2: Fuel Cells: Fuel cell working principle, Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), Fuel cell efficiency, Basic design of fuel cell,

UNIT-3: Photo and Photo electrochemical Conversions: Photochemical cells and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions.

UNIT-4:Solar Energy: Solar energy introduction and prospects, photo voltaic (PV) technology, concentrated solar power (CSP), Solar Fuels, Solar cells .

UNIT-5: Hydrogen Storage: Hydrogen Storage, Chemical and Physical methods of hydrogen storage, Hydrogen Storage in metal hydrides, metal organic frame works (MOF), Carbon structures, metal oxide porous structures, hydrogel storage by high pressure methods. Liquifaction method.

References :

1. Physical chemistry by Ira N. Levine
2. Essentials of Physical Chemistry, Bahl and Bahl and Tuli.
3. Inorganic Chemistry, Silver and Atkins
4. Fuel Cell Hand Book 7th Edition, by US Department of Energy (EG&G technical services and corporation)
5. Hand book of solar energy and applications by Arvind Tiwari and Shyam.
6. Solar energy fundamental, technology and systems by Klaus Jagar et.al.
7. Hydrogen storage by Levine Klebonoff

III B.TECH – II SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Course Code	Disaster Management	L	T	P	C
20A60105		3	0	0	3

Course Objectives:

1. To give knowledge types of disasters and stages in disaster rehabilitation process.
2. To make awareness on change in climates and their impacts on occurrence of environmental disasters.
3. To impart knowledge on Consideration of wind and water effects as per codal provisions to withstand disasters.
4. To familiarize the student with the Causes of earthquake and their effects and remedial methods to be adopted for buildings.
5. To illustrate the methodology in Planning and design considerations of various structures constructing in disaster prone areas.

Course Outcomes (CO):

1. About various types of disasters and stages in disaster rehabilitation process.
2. Impact of change in climates and their impacts on occurrence of environmental disasters.
3. Adopting suitable codal provisions to study the effect of wind and water effects on various structures constructed at disaster prone areas.
4. Causes of earthquake and their effects and remedial methods to be adopted for buildings.
5. Adopt suitable Planning and design considerations of various structures constructing in disaster prone areas.

UNIT - I

Brief introduction to different types of natural disaster, Occurrence of disaster in different climatic and geographical regions, hazard (earthquake and cyclone) map of the world and India, Regulations for disaster risk reduction, Post disaster recovery and rehabilitation (socioeconomic consequences)

UNIT - II

Climate change and its impact on tropical cyclone, Nature of cyclonic wind, velocities and pressure, Cyclone effects, Storm surge, Floods, Landslides. Behavior of structures in past cyclones and wind storms, case studies. Cyclonic retrofitting, strengthening of structures and adaptive sustainable reconstruction. Life–line structures such as temporary cyclone shelter.

UNIT - III

Basic wind engineering, aerodynamics of bluff bodies, vortex shedding and associated unsteadiness along and across wind forces. Lab: Wind tunnel testing, its salient features. Introduction to Computational fluid dynamics. General planning/design considerations under wind storms & cyclones; Wind effects on buildings, towers, glass panels etc, & wind

resistant features in design. Codal Provisions, design wind speed, pressure coefficients; Coastal zoning regulation for construction & reconstruction phase in the coastal areas, innovative construction material & techniques, traditional construction techniques in coastal areas.

UNIT - IV

Causes of earthquake, plate tectonics, faults, seismic waves; magnitude, intensity, epicenter, energy release and ground motions. Earthquake effects – On ground, soil rupture, liquefaction, landslides. Performance of ground and building in past earthquakes: Behavior of various types of buildings, structures, and collapse patterns; Behavior of Non-structural elements like services, fixtures, mountings- case studies. Seismic retrofitting-Weakness in existing buildings, aging, concepts in repair, restoration and seismic strengthening.

UNIT - V

General Planning and design consideration; Building forms, horizontal and vertical eccentricities, mass and stiffness distribution, soft storey etc.; Seismic effects related to building configuration. Plan and vertical irregularities, redundancy and setbacks. Various Types and Construction details of: Foundations, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, under-ground – overhead tanks, staircases and isolation of structures; innovative construction material and techniques; Local practices: traditional regional responses; Computational investigation techniques.

Textbooks:

3. Disaster Management by Rajib Shah, Universities Press, India, 2003
4. Disaster Management by R.B. Singh (Ed) Rawat Publication, New Delhi, 2000

Reference Books:

7. Natural disasters. By Abbott, L. P. (2013) 9th Ed. McGraw-Hill.
8. Earthquake Resistant Design of Structures. By Agarwal, P. and Shrikhande, M. (2009). New Delhi : PHI Learning.
9. Mapping Vulnerability: Disasters, Development and People. byBankoff, G., Frerks, G. and Hilhorst, D. (2004). London :Earthscan.
10. Improving Earthquakes and Cyclone Resistance of Structures:Guidelines for the Indian Subcontinent. TERI
11. Disaster Mitigation, preparedness, recovery and Response. By Sinha, P. C. (2006). New Delhi : SBS Publishers.
12. World Bank. (2009). Handbook for Reconstructingafter Natural Disasters.

Online Learning Resources:

Open Elective Course – II EEE

III B.TECH – II SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Course Code	RENEWABLE ENERGY SYSTEMS		L	T	P	C
20A60205	(OE-II)		3	0	0	3
Pre-requisite		Semester	VI			

Course Objectives: To make the students learn about:

- Various sources of Energy and the need of Renewable Energy Systems.
- The concepts of Solar Radiation, Wind energy and its applications.
- Operation of Solar thermal and solar PV systems
- The concept of geo thermal energy and its applications, biomass energy, the concept of Ocean energy and fuel cells.

Course Outcomes (CO): At the end of the course the student will be able to:

CO 1 Understand various alternate sources of energy for different suitable application requirements.
CO 2 Analyze the concepts of solar energy generation strategies and wind energy system
CO 3 Design Solar and Wind energy systems.
CO 4 Apply the concepts of Geo Thermal Energy, Ocean Energy, Bio mass and Fuel Cells for generation of power.

UNIT - I	SOLAR ENERGY	Lecture Hrs: 10

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy-thermal storage.

UNIT - II	PV ENERGY SYSTEMS	Lecture Hrs: 10

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems.

UNIT - III	WIND ENERGY	Lecture Hrs: 10

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations.

UNIT - IV	GEOTHERMAL ENERGY	Lecture Hrs: 8

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India.

UNIT - V	MISCELLANEOUS ENERGY TECHNOLOGIES	Lecture Hrs: 10

Ocean Energy: Tidal Energy-Principle of working, performance and limitations. Wave Energy-Principle of working, performance and limitations.
Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration
Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations.

Text books:

1. Stephen Peake, "Renewable Energy Power for a Sustainable Future", Oxford International Edition, 2018.
2. G. D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, 2000.

Reference Books:

1. S. P. Sukhatme, "Solar Energy",3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd, 2008.
2. B H Khan , " Non-Conventional Energy Resources", 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
3. S. Hasan Saeed and D.K.Sharma,"Non-Conventional Energy Resources",3rd Edition, S.K.Kataria& Sons, 2012.
4. G. N. Tiwari and M.K.Ghosal, "Renewable Energy Resource: Basic Principles and Applications", Narosa Publishing House, 2004.

Online Learning Resources:

1. https://nptel.ac.in/courses/103103206
2. https://nptel.ac.in/courses/108108078

https://www.slideshare.net/fatimahAlkreem/e-businessppt-67935771
https://www.slideshare.net/VikramNani/e-commerce-business-models
https://www.slideshare.net/RiteshGoyal/electronic-payment-system
https://www.slideshare.net/WelingkarDLP/electronic-security
https://www.slideshare.net/Ankitha2404/emarketing-ppt

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – II Mechanical
III B.TECH – II SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Subject Code	Title of the Subject	L	T	P	C
20A60305	**SOLAR ENERGY SYSTEMS**	3	0	0	3

Course objectives

Learning the fundamental principles of solar radiation and geographic distribution of solar radiation.

Study of various solar energy technologies with different types of concentrating collectors.

Comparative study of different solar cells with respect to properties and applications of solar cells in nano technology.

Understanding the basics of economics involves in the solar system.

Learning the concepts and designing aspects in thermal power. 6. Study of solar pond and solar stills and their applications.

UNIT – I

SOLAR RADIATION:

Sources of radiation –sun earth relationship, Solar Time and angles, day length, angle of incidence on tilted surface; Sun path diagram, Solar Radiation: Extraterrestrial Radiation; Effect of earth atmosphere; Estimation of solar radiation on horizontal and tilted surfaces. Geographic Distribution of solar radiation, Phyrellio, pyranometer, equation of time-estimation of average radiation falling on tilled.

UNIT-II

SOLAR ENERGY TECHNOLOGIES:

Performance analysis of a liquid Flat-plate collector, Total loss coefficient and heat losses: Top loss coefficient, Bottom loss coefficient, Side loss coefficient. Solar concentrating collectors, types of concentrating collectors, Parabolic Dish System, The central power tower system, The Parabolic Trough System, Tracking CPC and Solar Swing, Performance analysis of cylindrical parabolic collector, Compound parabolic concentrator (CPC).

UNIT-III

SOLAR CELLS:

Solar cell fundamentals, solar cell classification, solar cell, module, panel array construction, maximum power pint trackers(MPPT), solar PV applications, The Recent developments in Solar cells, Role of Nano-Technology in Solar cells.

UNIT – IV

ECONOMICS:

Discounted Cash Flow-light cycle, coasting of solar system, production function and optimization

UNIT – V

THERMAL POWER:

The power concepts- design aspects, thermo-chemical reactor.

SOLAR POND AND SOLAR STILLS:

Working Principle-Construction-operating difficulties and remedies, Agriculture and Domestic applications: Still, timber drying, crop drying, cooker.

Course Outcomes :

Illustrate the fundamental principles of solar radiation and geographic distribution of solar radiation.

Obtaining the performance analysis of liquid flat plate collector and cylindrical parabolic collector.

Developing solar cells in the field of nano technology.

Calculating the cash flow and costs involves in the solar energy systems.

Designing and developing of thermo chemical reactor with respect to thermal power.

Reference Books:

Solar Energy Thermal Process Diffice and Beckman

Solar Heating and Cooling by Kreith and Kreider

Solar Energy Utilization by G.D.Rai

Solar Energy Utilization by G.D.Rai , Khanna Publishers.

Renewable Energy Sources and Emerging Technologies- By D.P. Kothari, PHI Pub.,

Applied Solar Energy by Meinel and Meinel

Non-Conventional Energy Resources by B.H . Khan, Tata McGraw Hill

Energy Resources Utilization and Technologies ByAnjaneyulu, BS Pub.

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – II ECE
III B.TECH – II SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Course Code	BASICS OF INTEGRATED CIRCUITS APPLICATIONS	L	T	P	C
20A60405		3	0	0	3

\Pre-requisite

Basics of Electronics and Communication Engineering

Course Objectives:

- To introduce the basic building blocks of linear & digital integrated circuits.
- To learn the linear and non - linear applications of operational amplifiers.
- To introduce the theory and applications of 555 and PLL.
- To learn the theory of ADC and DAC
- To understand different families of digital integrated circuits and their characteristics.

Course Outcomes (CO): At the end of this course, the students will be able to

- Understand the basic concepts of Op -AMPs, characteristics and specifications.
- Design circuits using operational amplifiers for various applications.
- Develop, apply and analyze circuits for advanced applications using Op-Amps, PLL, VCO and Analog multipliers.
- Understand different families of digital integrated circuits and their characteristics
- Design various and sequential circuits using digital ICs.

UNIT - I

Operational Amplifier: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT - II

Op-Amp, IC-555 & IC 565 Applications: Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL - Block Schematic, Description of Individual Blocks, Applications.

UNIT - III

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT - IV

Digital Integrated Circuits: Classification of Integrated Circuits, Comparison of Various Logic Families, CMOS Transmission Gate, IC interfacing- TTL Driving CMOS & CMOS Driving TTL

Combinational Logic ICs – Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT - V

Sequential Logic ICs and Memories: Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers. Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

Textbooks:

1. Ramakanth A. Gayakwad, "Op-Amps & Linear ICs", PHI, 2003.
2. Floyd and Jain, "Digital Fundamentals", Pearson Education, 8th Edition, 2005.

Reference Books:

1. D. Roy Chowdhury, "Linear Integrated Circuits", New Age International (p) Ltd, Second Edition, 2003.
2. James M. Fiore, "Op Amps and Linear Integrated Circuits-Concepts and Applications", Cengage Learning/ Jaico, 2009.
3. K.Lal Kishore, "Operational Amplifiers with Linear Integrated Circuits", Pearson, 2009.
4. John. F. Wakerly, "Digital Design Principles and Practices", Pearson, Third Edition, 2005.

Online Learning Resources:

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – II CSE
III B.TECH – II SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Introduction to Linux Programming

Course Code:20A60505 **L T P C : 3 0 0 3**

Course Objectives:

- To study the commands according to user requirements.
- To utilize Shell scripts to perform the given task.
- To enable writing own programs in UNIX.
- To know AWK programs.

Course Outcomes:

CO1: Develop text data processing applications using Unix commands and filters.

CO2: Design and develop text based user interface components

CO3: Understand user management, network management and backup utilities

CO4: Use the system calls for file management

CO5: Understands the Concept of Process Threads and File Structure.

UNIT-I: Introduction,Unix File System,Unix Commands

Operating System, History of UNIX, Overview and Features of Unix System,Structure of Unix System, Unix Environment. **Unix File System**: Introduction of Files, Organization of File Systems, Accessing File Systems, Structure of File Systems. **Unix Commands**: Basic Commands, Advanced Unix Commands: File Access Permissions, Pipe Operator, cut, paste, wc, sort, head, tail, diff, cmp, uniq, comm, time, Conversions between DOS and Unix, man.

UNIT-II: File management and Compression Techniques,Manipulating Processes and Signals
Managing and Compressing Files, Computer Devices, Disk related Commands, Compression and Uncompressing Files, Important Unix System Files, Shell Variables, Export of Local and Global Shell Variables.
Manipulating Processes and Signals: Process Basics, Processes States and Transitions, Zombie Process, Context switching, Threads, ps-status of Process.
UNIT-III: System calls
Introduction, File-related System calls (open, create, read, write, lseek), File-related System calls (close, mknod, link and unlink, access, and chown, chmod), Directory Handling System calls (mkdir, rmdir, chdir, opendir, readdir, telldir, closedir), Process related System calls (exec, fork, wait,exit).
Editors in Unix: introduction, Stream editor, Emacs Editor.

UNIT-IV: AWK Script,Burne Shell

AWK Command, print, printf, Displaying Content of Specified Patterns, Comparison Operators, Compound Expressions, Arithmetic Operators, Begin and end Sections, User-defined Variables, if else Statement, Built-in Variables, Changing Input Filed Separator, Functions, Loops, Getting Input from User, Search and Substitute Functions, Copying results into Another file.

Bourne Shell: Introduction, beginning Bourne Shell Scripting, Writing Shell Scripts, Command Line Parameters, read, for Loop, While Loop, if Statement, Bourne Shell Commands.

UNIT-V: InterprocessCommunicaation, Unix System Administration and Networking

Interprocess Communication, Synchronization, Filters.

Unix System Administration and Networking: Unix Booting Procedure,Mounting Unix File System, Unmounting Unix File System, Managing User Accounts, Networking Tools, mail Command, Distributed File System, Firewalls, Backup and Restore.

TEXT BOOKS

1. "UNIX and SHELL Programming", B.M. HARWANI, OXFORD UNIVERSITY PRESS.

REFERENCES

1. "UNIX and Linux System Administration Handbook", Evi Nemeth, Garth Snyder, Trent R. Hein and Ben Whaley, PHI

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – II Chemical

III B.TECH – II SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Course Code	**OE2. GREEN TECHNOLOGY**	**L**	**T**	**P**	**C**
20A60805		**3**	**0**	**0**	**3**

Pre-requisite

Course Objectives:

Course Outcomes (CO):

At the end of the course, the student will be able to:

CO1	Understand the basic knowledge of environmental issues and estimate the risk
CO2	Evaluate the exposures
CO3	To discuss the type of wastes and emissions that drive the environmental impacts
CO4	Estimation of the environmental properties, persistence, ecosystem risk,
CO5	To present approaches and methodologies for evaluating and improving the environmental performance of chemical processes and chemical products.

UNIT - I

An introduction to environmental issues: Role of chemical processes and chemical products, Global environmental issues, Air and water quality issues, Ecology.

Risk concept: Description of risk, Risk assessment concept, Dose-response, Exposure assessment.

UNIT - II

Evaluating exposures: Occupational exposures: recognition, evaluation, control, Exposure assessment for chemicals in the ambient environment, Designing safer chemicals.

Green chemistry:Green chemistry methodologies, Optimization based frameworks for the

design of green chemical synthesis pathway.

UNIT - III

Evaluating environmental fate: Chemical and physical property estimation, estimating environmental persistence, estimating ecosystem risk, classifying environmental risk based on chemical structure.

UNIT - IV

Life-cycle concepts: Life-cycle assessment, Life-cycle impact assessment

UNIT - V

Material flows in chemical manufacturing, Assessing opportunities for waste exchanges and by-product synergies.

Textbooks:

SHONNARD, DALLEN, D. Green Engineering: Environmentally Conscious Design of Chemical Processes.

Reference Books:

Online Learning Resources:

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – II

III B.TECH – II SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF MATHEMATICS

Course Code	Mathematical Modelling & Simulation (Common for CIVIL,MECH&CHEM)		L	T	P	C
20A65101			0	3	0	3
Pre-requisite		Semester	II			

Course Objectives:

This course focuses on what is needed to build simulation software environments, and not just building simulations using preexisting packages.

Course Outcomes (CO): Student will be able to

- understand basic Model Forms.
- understand basic Simulation Approaches.
- evaluate handling Stepped and Event-based Time in Simulations.
- distinguish Discrete versus Continuous Modeling.
- apply Numerical Techniques.
- calculate Sources and Propagation of Error.

UNIT - I		8 Hrs

Simulation Basics-Handling Stepped and Event-based Time in Simulations-Discrete versus Continuous Modelling-Numerical Techniques-Sources and Propagation of Error

UNIT - II		9 Hrs

Dynamical, Finite State, and Complex Model Simulations-Graph or Network Transitions Based Simulations-Actor Based Simulations-Mesh Based Simulations-Hybrid Simulations

UNIT - III		8 Hrs

Converting to Parallel and Distributed Simulations-Partitioning the Data-Partitioning the Algorithms-Handling Inter-partition Dependencies

UNIT - IV		8 Hrs

Probability and Statistics for Simulations and Analysis-Introduction to Queues and Random Noise-Random Variates Generation-Sensitivity Analysis

UNIT - V		9 Hrs

Simulations Results Analysis and Viewing Tools-Display Forms: Tables, Graphs, and Multidimensional Visualization-Terminals, X and MS Windows, and Web Interfaces-Validation of Model Results.

Textbooks:

1. Mathematical modeling, JN Kapur, Newage publishers
2. Mathematical Modeling and Simulation: Introduction for Scientists and Engineers
   by Kai Velten, Wiley Publishers

Reference Books:

1. Introduction to Mathematical Modeling and Computer Simulations
   By Vladimir Mityushev,WojciechNawalaniecNataliaRylko Published by Chapman and Hall/CRC.

Online Learning Resources:

http://www.cse.chalmers.se/~dag/docs/matmodReport6.pdf
https://www.slideshare.net/arupparia/introduction-to-mathematical-modelling-42588379
https://www.slideshare.net/mailrenuka/simulation-for-queuing-problems-using-random-numbers

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – II

III B.TECH – II SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF MATHEMATICS

Course Code	Wavelet transforms and its Applications (Common for EEE&ECE)		L	T	P	C
20A65102			0	3	0	3
Pre-requisite	Fourier Series	Semester	II			

Course Objectives:

This course provides the students to understand Wavelet transforms and its applications.

Course Outcomes (CO): Student will be able to

- understand wavelets and wavelet expansion systems.
- illustrate the multi resolution analysis ad scaling functions.
- form fine scale to coarse scale analysis.
- find the lattices and lifting.
- perform numerical complexity of discrete wavelet transforms.
- find the frames and tight frames using Fourier series.

UNIT - I	Wavelets	9 Hrs

Wavelets and Wavelet Expansion Systems - Wavelet Expansion- Wavelet Transform- Wavelet System- More Specific Characteristics of Wavelet Systems - Haar Scaling Functions and Wavelets -effectiveness of Wavelet Analysis -The Discrete Wavelet Transform The Discrete-Time and Continuous Wavelet Transforms.

UNIT - II	A Multiresolution Formulation of Wavelet Systems	8 Hrs

Signal Spaces -The Scaling Function -Multiresolution Analysis - The Wavelet Functions - The Discrete Wavelet Transform- A Parseval's Theorem - Display of the Discrete Wavelet Transform and the Wavelet Expansion.

UNIT - III	Filter Banks and the Discrete Wavelet Transform	9 Hrs

Analysis - From Fine Scale to Coarse Scale- Filtering and Down-Sampling or Decimating -Synthesis - From Coarse Scale to Fine Scale -Filtering and Up-Sampling or Stretching - Input Coefficients - Lattices and Lifting - -Different Points of View.

UNIT - IV	Time-Frequency and Complexity	9 Hrs

Multiresolution versus Time-Frequency Analysis- Periodic versus Nonperiodic Discrete Wavelet Transforms -The Discrete Wavelet Transform versus the Discrete-Time Wavelet Transform- Numerical Complexity of the Discrete Wavelet Transform.		
UNIT - V	Bases and Matrix Examples	8 Hrs
Bases, Orthogonal Bases, and Biorthogonal Bases -Matrix Examples - Fourier Series Example - Sine Expansion Example - Frames and Tight Frames - Matrix Examples -Sine Expansion as a Tight Frame Example.		
Textbooks:		
1. C. Sidney Burrus, Ramesh A. Gopinath, “Introduction to Wavelets and Wavelets Transforms”,Prentice Hall, (1997). 2. James S. Walker, “A Primer on Wavelets and their Scientific Applications”, CRC Press, (1999).		
Reference Books:		
1. Raghuveer Rao, “Wavelet Transforms”, Pearson Education, Asia.		
Online Learning Resources:		
https://www.slideshare.net/RajEndiran1/introduction-to-wavelet-transform-51504915		

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – II

III B.TECH – II SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF MATHEMATICS

Course Code	Statistical Methods for Data Science		L	T	P	C
20A65103	CSE (Data Science)			3		3
Pre-requisite		Semester	II			

Course Objectives:

This course aims at providing knowledge on basic concepts of Statistics, Estimation and testing of hypotheses for large and small samples.

Course Outcomes (CO): Student will be able to

- Understand the basic concepts of Statistics
- Analyze data and draw conclusion about collection of data under study using Point estimation
- Analyze data and draw conclusion about collection of data under study using Interval estimation
- Analyzing the tests and types of errors for large samples
- Apply testing of hypothesis for small samples.

UNIT - I	Basic Concepts	9 Hrs

Population, sample, parameter and statistic; characteristics of a good estimator; Consistency – Invariance property of Consistent estimator, Sufficient condition for consistency; Unbiasedness; Sufficiency – Factorization Theorem – Minimal sufficiency; Efficiency – Most efficient estimator, likelihood equivalence, Uniformly minimum variance unbiased estimator,applications of Lehmann-Scheffe's Theorem, Rao - Blackwell Theorem and applications

UNIT - II	Point Estimation	8 Hrs

Point Estimation- Estimator, Estimate, Methods of point estimation – Maximum likelihood method (the asymptotic properties of ML estimators are not included), Large sample properties of ML estimator(without proof)- applications , Method of moments, method of least squares, method of minimum chi-square and modified minimum chi-square-Asymptotic Maximum Likelihood Estimation and applications.

UNIT - III	Interval Estimation	8 Hrs

Confidence limits and confidence coefficient; Duality between acceptance region of a test and a confidence interval; Construction of confidence intervals for population proportion (small and large samples) and between two population proportions(large

samples); Confidence intervals for mean and variance of a normal population; Difference between the mean and ratio of two normal populations.		
UNIT - IV	**Testing of hypotheses**	**9 Hrs**
Types of errors, power of a test, most powerful tests; Neyman-Pearson Fundamental Lemma and its applications; Notion of Uniformly most powerful tests; Likelihood Ratio tests: Description and property of LR tests - Application to standard distributions.		
UNIT - V	**Small sample tests**	**9 Hrs**
Student's t-test, test for a population mean, equality of two population means, paired t-test, F-test for equality of two population variances,CRD,RBD,LSD; Chi-square test for goodness of fit and test for independence of attributes, $\chi 2$ test for testing variance of a normal distribution Sign test, Signed rank test, Median test, Mann-Whitney test, Run test and One sample Kolmogorov –Smirnov test ,Kruskal – Wallis H test(Description, properties and applications only).		
Textbooks:		
1. Manoj Kumar Srivastava and Namita Srivastava, Statistical Inference – Testing of Hypotheses, Prentice Hall of India, 2014. 2. Robert V Hogg, Elliot A Tannis and Dale L.Zimmerman, Probability and Statistical Inference,9th edition,Pearson publishers,2013.		
Reference Books:		
1. S.P.Gupta, Statistical Methods, 33rd Edition, Sultan Chand & Sons. 2. Miller and John E Freund, Probability and Statistics for Engineers, 5th Edition.		
Online Learning Resources:		
1. https://www.statstutor.ac.uk/resources/uploaded/1introduction3.pdf 2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2996198/		

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – II

III B.TECH – II SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

PHYSICS OFELECTRONICMATERIALS ANDDEVICES

COURSE OBJECTIVES

1 To impart the fundamental knowledge on various materials, their properties and

Applications.

2 To provide insight into various semiconducting materials and their properties.

3 To elucidate the characteristic behavior of various semiconductor devices.

4 To provide the basics of dielectric and piezoelectric materials and their properties.

5 To explain different categories of magnetic materials, mechanism and their

advanced applications.

COURSE OUTCOMES

At the end of the course the student will be able

CO1 To understand the fundamentals of various materials.

CO2 To exploit the physics of semiconducting materials

CO3 To familiarize with the working principles of semiconductor-based devices.

CO4 To understand the behavior of dielectric and piezoelectric materials.

CO5 To make use of the magnetic materials for advanced applications.

SYLLABUSCredit: 3 Hours of teaching: - 45 H

UNIT-1 Fundamentals of Materials Science: 9H

Introduction, Phase rule, Phase Diagram, Elementary idea of Nucleation and Growth, Methods of crystal growth. Basic idea of point, line and planar defects.Concept of thin films, preparation of thin films, Deposition of thin film using sputtering methods (RF and glow discharge).

UNIT-2: Semiconductors: 9H

Introduction, charge carriers in semiconductors, effective mass, Diffusion and drift, Diffusion and recombination, Diffusion length. The Fermi level & Fermi-Dirac distribution, Electron and Hole in quantum well, Change of electron-hole concentration- Qualitative analysis, Temperature dependency of carrier concentration, Conductivity and mobility, Effects of temperature and doping on mobility, High field effects.

UNIT-3: Physics of Semiconductor Devices: 9H

Introduction, Band structure, PN junctions and their typical characteristics under equilibrium.and under bias, Construction and working principles of: Light emitting diodes, Heterojunctions, Transistors, FET and MOSFETs.

UNIT-4: Dielectric Materials and their Applications: 9H

Introduction, Dielectric properties, Electronic polarizability and susceptibility, Dielectric constant and frequency dependence of polarization, Dielectric strength and dielectric loss, Piezoelectric properties- Ferroelectricity-Applications.

UNIT-5: Magnetic Materials and their Applications: 9H

Introduction, Magnetism & various contributions to para and dia magnetism, Ferro and Ferri magnetism and ferrites, Concepts of Spin waves and Magnons, Anti-ferromagnetism, Domains and domain walls, Coercive force, Hysteresis, Nano-magnetism, Super-paramagnetism – Properties and applications.

Text Books

1. Principles of Electronic Materials and Devices-S.O. Kasap, McGraw-Hill Education (India) Pvt. Ltd.,3rd edition, 2007.

2. Electronic Components and Materials- Grover and Jamwal, DhanpatRai and Co.

Reference Books:

1. Solid State Electronic Devices -B.G. Streetman and S. Banerjee, PHI Learning,6th edition

2. Electronic Materials Science- Eugene A. Irene, , Wiley, 2005

3. An Introduction to Electronic Materials for Engineers-Wei Gao, Zhengwei Li, Nigel Sammes, World Scientific Publishing Co. Pvt. Ltd., , 2nd Edition,2011

4. A First Course In Material Science- by Raghvan, McGraw Hill Pub.

5. The Science and Engineering of materials- Donald R.Askeland,Chapman& Hall Pub.

6. Electrical Engineering Materials-by A.J. Dekker, PHI Pub

NPTEL courses links

https://nptel.ac.in/courses/113/106/113106062/

https://onlinecourses.nptel.ac.in/noc20_mm02/preview

https://nptel.ac.in/noc/courses/noc17/SEM1/noc17-mm07

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – II H& SS

III B.TECH – II SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Course Code	Academic Writing and Public Speaking		L	T	P	C
20A65501			3	0	0	3
Pre-requisite						

Course Objectives:

- ➢ To encourage all round development of the students by focusing on writing skills
- ➢ To make the students aware of non-verbal skills
- ➢ To develop analytical skills
- ➢ To deliver effective public speeches

Course Outcomes (CO):

By the end of the program students will be able to

- Define various elements of Academic Writing
- Understand how to paraphrase sources and avoid plagiarism
- Demonstrate the knowledge in writing a Research paper
- Analyse different types of essays
- Assess the speeches of others and know the positive strengths of speakers
- Build confidence in giving an impactful presentation to the audience

UNIT - I	Introduction to Academic Writing	Lecture Hrs

Introduction to Academic Writing – Essential Features of Academic Writing – Courtesy – Clarity – Conciseness – Correctness – Coherence – Completeness – Types – Descriptive, Analytical, Persuasive, Critical writing

UNIT - II	**Academic Journal Article**	Lecture Hrs

Art of condensation- summarizing and paraphrasing - Abstract Writing, writing Project Proposal, writing application for internship, Technical/Research/Journal Paper Writing – Conference Paper writing - Editing, Proof Reading - Plagiarism

UNIT - III	**Essay & Writing Reviews**	Lecture Hrs

Compare and Contrast – Argumentative Essay – Exploratory Essay – Features and Analysis of Sample Essays – Writing Book Report, Summarizing, Book/film Review-

UNIT - IV	Public Speaking	Lecture Hrs

Introduction, Nature, characteristics, significance of Public Speaking – Presentation – 4 Ps of Presentation – Stage Dynamics – Answering Strategies –Analysis of Impactful Speeches- Speeches for Academic events		
UNIT - V	Public Speaking and Non-Verbal Delivery	Lecture Hrs
Body Language – Kinesics – Oculesics – Proxemics – Haptics – Paralanguage		

Textbooks:

3. **Critical Thinking, Academic Writing and Presentation Skills: Mg University Edition Paperback – 1 January 2010 Pearson Education; First edition (1 January 2010)**
4. **A Course In Academic Writing Paperback – 1 January 2017Publisher : The Orient Blackswan; Second edition (1 January 2017)**

Reference Books:

1. **A Handbook For Academic Writing and Composition Paperback – 1 January 2014** by Nzanmongi Jasmine PattonPublisher : Pinnacle Learning; 1st edition (1 January 2014)
2. Critical Thinking, Academic Writing and Presentation Skills: Mg University Edition Paperback – 1 January 2010Publisher : Pearson Education; First edition (1 January 2010) by Marilyn Anderson (Author)
3. Effective Academic Writing Second Edition: 1: Student Book: The Paragraph Paperback – Student Edition, 9 June 2014 by Alice Savage (Author), MasoudShafiei (Author)Publisher : Oxford University Press; Student, Workbook edition (9 June 2014)
4. A Course In Academic Writing Paperback – 1 January 2017 by Renu Gupta (Author) Publisher : The Orient Blackswan; Second edition (1 January 2017)

Online Learning Resources:

1. https://youtu.be/NNhTIT81nH8
2. phttps://www.youtube.com/watch?v=478ccrWKY-A
3. https://www.youtube.com/watch?v=nzGo5ZC1gMw
4. https://www.youtube.com/watch?v=Qve0ZBmJMh4

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – II

III B.TECH – II SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF CHEMISTRY

Subject Code	Title of the Subject	L	T	P	C
	CHEMISTRY OF POLYMERS AND ITS APPLICATIONS	2	1	-	3

COURSE OBJECTIVES	
1	To understand the basic principles of polymers
2	To synthesize the different polymeric materials and their characterization by various instrumental methods.
3	To impart knowledge to the students about fundamental concepts of Hydro gels of polymer networks, surface phenomenon by micelles
4	To enumerate the applications of polymers in engineering

COURSE OUTCOMES	
CO1	Classify the polymers, Explain polymerization mechanism, Differentiate addition, condensation polymerizations, Describe measurement of molecular weight of polymer
CO2	Differentiate Bulk, solution, Suspension and emulsion polymerization, Describe fibers and elastomers, Identify the thermosetting and thermo polymers, Characterize the properties of polymers by IR, NMR, XRD etc.
CO3	Describe the properties and applications of polymers, Interpret the properties of cellulose, lignin, starch, rosin, latex etc., Discuss the special plastics of PES, PAES, PEEK etc., Explain modified cellulosics
CO4	Identify types of polymer networks, Describe methods involve in hydrogel preparation, Explain applications of hydrogels in drug delivery, Demonstrate the advanced drug delivery systems and controlled release
CO5	Demonstrate electrical phenomena at interfaces including electrokinetics, miselles, reverse micelles etc., Explain photoelectron spectroscopy, Discuss ESCA and Auger spectroscopy to the study of surfaces, Differentiate micelles and reverse micelles

SYLLABUS

Unit – I: Polymers-Basics and Characterization :-

Basic concepts: monomers, repeating units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization: addition, condensation, co polymerization and coordination. Average molecular weight concepts: number, weight and viscosity average molecular weights, polydispersity and molecular weight distribution. Measurement of molecular weight: end group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers.

Unit – II: Synthetic Polymers

Addition and condensation polymerization processes – Bulk, Solution, Suspension and Emulsion polymerization. Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications. Preparation of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol – formaldehyde. Melamine Epoxy and Ion exchange resins. Characterization of polymers by IR, NMR, XRD

Unit – III : Natural Polymers & Modified cellulosics

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins. Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEA.

Unit-IV: Hydrogels of Polymer networks and Drug delivery

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels**,** Applications of hydrogels in drug delivery.

Introduction to drug systems including, drug development, regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release.

Unit – V: Surface phenomena

Surface tension, adsorption on solids, electrical phenomena at interfaces including electrokinetics, micelles, reverse micelles, solubilization. Application of photoelectron spectroscopy, ESCA and Auger spectroscopy to the study of surfaces.

References :

1. A Text book of Polymer science, Billmayer
2. Organic polymer Chemistry, K.J.Saunders, Chapman and Hall
3. Advanced Organic Chemistry, B.Miller, Prentice Hall
4. Polymer Chemistry – G.S.Mishra
5. Polymer Chemistry – Gowarikar
6. Physical Chemistry –Galston
7. Drug Delivery- Ashim K. Misra

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – III CIVIL

IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

	Building Technology for Engineers	L	T	P	C
Course Code					
20A70104		**3**	**0**	**0**	**3**

Course Objectives :

6. To make the student familiar with varioustypes of Buildings and its components
7. To teach the students about general requirements of building regarding safety and transportation
8. To impart knowledge on various special requirements of buildings regarding ventilation, insulation acoustics, etc,.
9. To make the student familiar with the concepts of various Prefabrication systems.
10. To Teach the students about various construction equipments used in building.

Course Outcomes:

By the end of this course the student will be able to

6. Classify various types of buildings and its components.
7. Understand the general requirements of building regarding safety and transportation.
8. Understand the Special requirements of buildings regarding ventilation, insulation acoustics, etc,.
9. Familiarize with the concepts of various Prefabrication systems.
10. Understand various construction equipments used in building.

UNIT-1

Building planning: Types of Buildings — components, definitions, economy and design, Principles and aspects of building planning, Definitions and importance of Grouping and circulation; Lighting and ventilation; Sustainability and Green Buildings.

UNIT-II

General requirements: Requirements for safety against fire, termite, damping, earthquakes, Vertical transportation in building — planning of vertical transportation, Stairs, different forms of stairs, Other modes of vertical transportation.

UNIT-III

Special Requirements: Air conditioning — process and classification of air conditioning, Dehumidification. Systems of air-conditioning, ventilation, functional requirements of ventilation. Thermal insulation. Acoustics, effect of noise, properties of noise and its measurements, Principles of acoustics of building. Sound insulation.

UNIT-IV

Prefabrication systems: Prefabricated walls, openings, cupboards, shelves etc., planning and modules and sizes of components in prefabrication. Plumbing services — water supply

system, maintenance of building pipe line, Sanitary fittings, Design of building drainage.

UNIT-V

Construction Equipment: Introduction and Planning for construction Equipment, Earthmoving and Excavating equipment, Pile driving equipment, Lifting and Concreting Equipment.

Learning Resources:

Text Books:

3. Building Construction, Punmia B. C., Jain A.J., and Jain A.J., Laxmi Publication, 2016, Eleventh Edition.
4. The Text book for Building Construction, Arora S. P., and Bindra S. P., Dhanpat Rai Pubications, 2010.

Reference Books:

3. Building Construction, Varghese P.C., PHI Learning Pvt. Ltd., 2017, 2nd Edition.
4. Construction Planning, Equipment and Methods, Robert P., Clifford J. S., and Aviad S., McGrawHiII Education, 2010

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – III EEE

IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

Course Code	**BATTERY MANAGEMENT SYSTEMS**		**L**	**T**	**P**	**C**
20A70204	**(OE-III)**		**3**	**1**	**0**	**4**
Pre-requisite	**Basic Electrical Engineering**	**Semester**	**VI**			

Course Objectives: To make the students learn about:

- Understand the role of battery management system and the requirements of BMS.
- Interpret the concept associated with battery charging / discharging process
- Analyze various parameters of battery and battery pack
- Design the model of battery pack

Course Outcomes (CO): After completion of this course, student will be able to

CO1: Understand and remember the basic concepts and terminologies of Cells and Batteries, charging, discharging methods, concept of cell balancing.

CO2: Analyze BMS functionality, various sensors used, control techniques, Sate of Charge estimation, cell total energy and cell total power.

CO3: Apply the equivalent circuits, physical models, empirical modelling of BMS.

CO4: Design of Battery management system considering various parameters and through simulation.

UNIT - I	**INTRODUCTION**	Lecture Hrs: 14

Introduction to Battery Management System, Cells & Batteries, Nominal voltage and capacity, C rate, Energy and power, Cells connected in series, Cells connected in parallel, Electrochemical and lithium-ion cells, Rechargeable cell, Charging and Discharging Process, Overcharge and Undercharge, Modes of Charging

UNIT - II	**BATTERY MANAGEMENT SYSTEM**	Lecture Hrs: 14

Introduction and BMS functionality, Battery pack topology, BMS Functionality, Voltage Sensing, Temperature Sensing, Current Sensing, BMS Functionality, High-voltage contactor control, Isolation sensing, Thermal control, Protection, Communication Interface, Range estimation, State-of charge estimation, Cell total energy and cell total power

UNIT - III	**BATTERY STATE OF CHARGE AND STATE OF HEALTH ESTIMATION**	Lecture Hrs: 12

Battery state of charge estimation (SOC), voltage-based methods to estimate SOC, Model-based state estimation, Battery Health Estimation, Lithium-ion aging: Negative electrode, Lithium ion aging: Positive electrode, Cell Balancing, Causes of imbalance, Circuits for balancing		
UNIT - IV	**MODELLING AND SIMULATION**	Lecture Hrs: 12
Equivalent-circuit models (ECMs), Physics-based models (PBMs), Empirical modelling approach, Physics-based modelling approach, Simulating an electric vehicle, Vehicle range calculations, Simulating constant power and voltage, Simulating battery packs		
UNIT - V	**DESIGN OF BATTERY MANAGEMENT SYSTEMS**	Lecture Hrs: 12
Design principles of battery BMS, Effect of distance, load, and force on battery life and BMS, energy balancing with multi-battery system		
Textbooks:		
1. Plett, Gregory L. Battery management systems, Volume I: Battery modelling. Artech House, 2015. 2. Plett, Gregory L. Battery management systems, Volume II: Equivalent-circuit methods. Artech House, 2015.		
Reference Books:		
1. Bergveld, H.J., Kruijt, W.S., Notten, P.H.L "Battery Management Systems -Design by Modelling" Philips Research Book Series 2002. 2. Davide Andrea," Battery Management Systems for Large Lithium-ion Battery Packs" Artech House, 2010 3. Pop, Valer, et al. Battery management systems: Accurate state-of-charge indication for battery-powered applications. Vol. 9. Springer Science & Business Media, 2008. 4. RuiXiong, "Battery management Algorithm for Electric Vehicles", China Machine Press, Springer,2020. 5. Bergveid, Krujit, Notten, " Battery Management Systems: Design by Modelling", Philips Research Book Series, Kluwer Academic Publishers.		
Online Learning Resources:		
1. https://www.coursera.org/learn/battery-management-systems		

Open Elective Course – III

IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF MECHANICAL ENGINEERING

Subject Code	Title of the Subject	L	T	P	C
20A70304	**MODERN MANUFACTURING METHODS**	3	0	0	3

Course Objectives:

To learn the importance and basics of unconventional machining.
To understand the rapid prototyping processes.

To have the knowledge of different micro machining methods
To understand the working principles of various Non-traditional machining methods.
To learn about Non-traditional forming processes.

UNIT-I

Need for Modern Manufacturing Methods: Non-traditional machining methods and rapid prototyping methods - their relevance for precision and lean manufacturing. Classification of non-traditional processes - their selection for processing of different materials and the range of applications.

Introduction to rapid prototyping - Classification of rapid prototyping methods - sterolithography, fused deposition methods - materials, principle of prototyping and various applications.

UNIT-II

Ultrasonic machining – Elements of the process, mechanics of material removal, process parameters, applications and limitations, Abrasive jet, Water jet and abrasive water jet machining: Basic mechanics of material removal, descriptive of equipment, process variables, applications and limitations.

UNIT-III

Electro –Chemical Processes: Fundamentals of electro chemical machining, electrochemical grinding, metal removal rate in ECM, Tooling, process variables, applications, economic aspects of ECM.

Chemical Machining: Fundamentals of chemical machining- Principle of material removal-maskants – etchants- process variables, advantages and applications.

UNIT-IV

Thermal Metal Removal Processes: Basic principle of spark erosion (EDM), Wire cut EDM, and Electric Discharge Grinding processes - Mechanics of machining, process parameters,

selection of tool electrode and dielectric fluids, choice of parameters for improved surface finish and machining accuracy - Applications of different processes and their limitations.

Plasma Machining: Principle of material removal, description of process and equipment, process variables, scope of applications and the process limitations.

UNIT-V

Electron Beam Machining: Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes - process mechanics, parameters, applications and limitations.

Laser Beam Machining: Process description, Mechanism of material removal, process parameters, capabilities and limitations, features of machining, applications and limitations.

Course Outcomes:

At the end of this course the student should be able to understand

Technical aspects of precision machining.
Applications of rapid prototyping technologies.
Tool selection for non traditional processes.
Knowledge of economic aspects of Non traditional processes.
Fabrication of microelectronic devices.

TEXT BOOKS:

Manufacturing processes for engineering materials by SeropeKalpakjian and Steven R Schmid, 5edn, Pearson Pub.
Advanced machining processes, VK Jain, Allied publishers.

REFERENCE:

New Technology , Bhattacharya A, The Institution of Engineers, India 1984
Manufacturing Technology, Kalpakzian, Pearson
Modern Machining Process, Pandey P.C. and Shah H.S., TMH.

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – III
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch
DEPARTMENT OF Electronic & Communication Engineering

Course Code	DIGITAL ELECTRONICS		L	T	P	C
20A70404			3	0	0	3
Pre-requisite		Semester	VII			

Basics of Electronics and Communication Engineering

Course Objectives:

- To learn simplification methods for minimizing Boolean functions and their realization using logic gates.
- To understand and design various combinational logic circuits like adders and code converters.
- To know the design of various combinational circuits useful to implement logic functions.
- To study the design of sequential logic circuits in synchronous and asynchronous modes.
- To introduce programmable logic devices.

Course Outcomes (CO): At the end of this course, the students will be able to

- Learn simplification methods for minimizing Boolean functions and their realization using logic gates.
- Understand and design various combinational logic circuits like adders and code converters.
- Know the design of various combinational circuits useful to implement logic functions.
- Gain knowledge on the design of sequential logic circuits in synchronous and asynchronous modes.
- Understand the operation and uses of programmable logic devices.

UNIT - I

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Introduction to Logic Gates, Ex-OR, Ex-NOR operations, Minimization of Switching Functions: Karnaugh map method, Quine – McCluskey Tabular Minimization Method. Logic function realization: AND-OR, OR-AND and NAND/NOR realizations.

UNIT - II

Introduction to Combinational Design 1: Binary Adders, Subtractors and BCD adder, Code converters - Binary to Gray, Gray to Binary, BCD to excess3, BCD to Seven Segment display.

UNIT - III

Combinational Logic Design 2: Decoders (3 to 8, octal to decimal), Encoders, Priority Encoders, Multiplexers, Demultiplexers, Comparators, Implementations of Logic Functions

using Decoders and Multiplexers.

UNIT - IV

Sequential Logic Design: Latches, Flipflops, S-R, D, T, JK and Master-Slave JK FF, Edge triggered FF, flipflop conversions, set up and hold times, Ripple and Synchronous counters, Shift registers.

UNIT - V

Programmable Logic Devices:ROM, Programmable Logic Devices (PLDs), Introduction to logic families and their comparisons.

Textbooks:

1. Digital Design, M. Morris Mano & Michel D. Ciletti, 5th Edition, Pearson Education, 1999.
2. Switching theory and Finite Automata Theory, ZviKohavi and Nirah K. Jha, 2nd Edition, Tata McGraw Hill, 2005.

Reference Books:

1. Fundamentals of Logic Design, Charles H Roth, Jr., 5th Edition, Brooks/coleCengage Learning, 2004.
2. Digital & State Machine Design, Comer, 3rd Edition, OXFORD.

Online Learning Resources:

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – III
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch
DEPARTMENT OF Compute Science & Engineering

Cyber Security

Course Code:20A70504 **L T P C : 3 0 0 3**

Course Objectives:

- To introduce the concepts of Java.
- To Practice object-oriented programs and build java applications.
- To implement java programs for establishing interfaces.
- To implement sample programs for developing reusable software components.
- To establish database connectivity in java and implement GUI applications.

Course Outcomes:

CO1: Recognize the Java programming environment.
CO2: Select appropriate programming constructs to solve a problem.
CO3: Develop efficient programs using multithreading.
CO4: Design reliable programs using Java exception handling features.
CO5: Extend the programming functionality supported by Java.

UNIT-I: Cybercrime

Cybercrime and information security, Cybercriminals, Classifications of cybercrimes, Need for Cyberlaws in Indian context, Legal perspectives of cybercrime, Indian perspective of cybercrimes, Cybercrime and the Indian ITA 2000, Positive aspects and weak areas of ITA 2000, Amendments made in Indian ITA 2000 for admissibility of e- records, Amendments to the Indian IT Act, Global perspective on cybercrimes, Intellectual property in cyberspace, Ethical dimension of cybercrimes.

UNIT-II: Cyber Offenses

Cybercrime and information security, Cybercriminals, Classifications of cybercrimes, Need for Cyberlaws in Indian context, Legal perspectives of cybercrime, Indian perspective of cybercrimes, Cybercrime and the Indian ITA 2000, Positive aspects and weak areas of ITA 2000, Amendments made in Indian ITA 2000 for admissibility of e- records, Amendments to the Indian IT Act, Global perspective on cybercrimes, Intellectual property in cyberspace, Ethical dimension of cybercrimes.

UNIT-III: Cybercrime in Mobile and Wireless Devices

Proliferation of mobile and wireless devices, Trends in mobility, Credit card frauds in mobile and wireless computing era, Security challenges posed by mobile devices, Registry settings for mobile devices, Authentication service security, Attacks on mobile/cell phones, Security implications of

mobile devices for organizations, Organizational measures for handling mobile devices related security issues.

UNIT-VI: Tools and Methods Used in Cybercrime

Proxy servers and anonymizers, Password cracking, Keyloggers and spywares, Virus and worms, Trojan horses and backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow, Attacks on wireless networks

UNIT-V: Cyber Forensics, Cybercrime in Real-World

Forensics of Computer and Handheld Devices: Cyber forensics, Cyber forensics and digital evidence, Forensics analysis of e-mail, Forensics and social networking sites, Forensics of handheld devices – Smartphone forensics, EnCase, Device Seizure, MOBIL edit.

Cybercrime examples, mini-cases, online scams: Real-life examples - Official website of Maharashtra Government hacked, Indian banks lose millions of rupees, Game source code stolen; Mini-cases - Indian Case of online gambling, Indian case of intellectual property crime; Online scams - Cheque cashing scam, Charity scams.

References:

1. K. A. Navas, “Electronics Lab Manual”, Volume I, PHI, 5th Edition, 2015, ISBN:9788120351424
2. Cyril Prasanna Raj P., “CMOS digital circuit design manual”, Volume 1, MSEC E-publication, Edition 2016

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – III
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch
DEPARTMENT OF Chemical Engineering

Course Code	INDUSTRIAL POLLUTION CONTROL ENGINEERING	L	T	P	C
20A70804		3	0	0	3

Pre-requisite

Course Objectives:

Course Outcomes (CO):

At the end of the course, the student will be able to:

CO1 Understand the different types of wastes generated in an industry, their effects on living and non-living things & environmental regulatory legislations and standards and climate changes.

CO2 Quantify, analyse and treat wastewater

CO3 Apply the different unit operations and unit processes involved in conversion of highly polluted water to potable standards

CO4 Apply the operating principles, design calculations of particulate control devices.

CO5 Estimate the different waste generated from the industries

UNIT - I

Types of emissions from chemical industries and effects of environment, environment legislation, Type of pollution, sources of wastewater, Effluent guidelines and standards. Characterization of effluent streams, oxygen demands and their determination (BOD, COD, and TOC), Oxygen sag curve, BOD curve mathematical, controlling of BOD curve, self purification of running streams, sources and characteristics of pollutants in fertilizer, paper and pulp industry, petroleum and petroleum industry.

UNIT - II

General methods of control and removal of sulfur dioxide, oxides of nitrogen and organic vapors from gaseous effluent, treatment of liquid and gaseous effluent in fertilizer industry. Air pollution sampling and measurement: Types of pollutant and sampling and measurement,ambient air sampling: collection of gaseous air pollutants, collection of particulate air pollutants. Stack sampling: sampling system, particulate sampling, and

gaseous sampling. Analysis of air pollutants: Sulphur dioxide, nitrogen oxides, carbon monoxide, oxidants and ozones, hydrocarbons, particulate matter

UNIT - III

Air pollution control methods and equipments: Source collection methods: raw material changes, process changes, and equipment modification. Cleaning of gaseous equipments particulate emission control: collection efficiency, control equipment like gravitational settling chambers, Cyclone separators, fabric filters, ESP and their constructional details and design aspects. Scrubbers: wet scrubbers, spray towers, centrifugal scrubbers, packed beds and plate columns, venturi scrubbers, their design aspects. Control of gaseous emissions: absorption by liquids, absorption equipments, adsorption by solids, equipment and the design aspects

UNIT - IV

Introduction to waste water treatment, biological treatment of wastewater, bacterial and bacterial growth curve, aerobic processes, suspended growth processes, activated aerated lagoons and stabilization ponds, attached growth processes, trickling filters, rotary drum filters, anaerobic processes.

UNIT - V

Methods of primary treatments: screening, sedimentation, flotation, neutralization, and methods of tertiary treatment. A brief study of carbon absorption, ion exchange, reverse osmosis, ultra-filtration, chlorination, ozonation, treatment and disposal. Hazardous waste management: nuclear wastes: health and environment effects, sources and disposal methods. Chemical wastes: health and environmental effects, treatment and disposal: treatment and disposal by industry, off site treatment and disposal, treatment practices in various countries. Biomedical wastes: types of wastes and their control.

Textbooks:

1. Environmental Pollution and Control Engineering, C. S. Rao – Wiley Eastern Limited, India, New Delhi, 1993.

2. Pollution Control in Process Industries, S.P. Mahajan, Tata McGraw-Hill, New Delhi, 1985.

Reference Books:

1. Wastewater Treatment, M. Narayana Rao and A.K.Datta, Oxford and IHB publ. New Delhi.

Online Learning Resources:

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – III
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF MATHEMATICS

Course Code	**Numerical Methods for Engineers (Common for all Branches)**	**L**	**T**	**P**	**C**
20A75101		**0**	**3**	**0**	**3**
Pre-requisite	**---**				

Course Objectives:

This course aims at providing the student with the knowledge on various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations.

Course Outcomes (CO): Student will be able to

- apply numerical methods to solve algebraic and transcendental equations.
- understand fitting of several kinds of curves.
- derive interpolating polynomials using interpolation formulae.
- Solve differential and integral equations numerically.

UNIT - I	**Solution of Algebraic & Transcendental Equations:**	8 Hrs

Introduction-Bisection method-Iterative method-Regula falsi method-Newton Raphson method. System of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

UNIT - II	**Curve Fitting**	8 Hrs

Principle of Least squares- Fitting of curves- Fitting of linear, quadratic and exponential curves.

UNIT - III	**Interpolation**	9 Hrs

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula

UNIT - IV	**Numerical Integration**	8 Hrs

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule

UNIT - V	**Solution of Initial value problems to Ordinary differential equations**	9 Hrs

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-

Picard's Method of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.
Textbooks:
4. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers. 5. Probability and Statistics for Engineers and Scientists, Ronald E. Walpole,PNIE. 6. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India
Reference Books:
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers. 4. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.
Online Learning Resources:
https://slideplayer.com/slide/8588078/

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – III
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF Physics

Subject Code	Title of the Subject	L	T	P	C
20A75201	**SMART MATERIALS AND DEVICES**	3		-	3

COURSE OBJECTIVES	
1	To provide exposure to smart materials and their engineering applications.
2	To impart knowledge on the basics and phenomenon behind the working of smart materials
3	To explain theproperties exhibited by smart materials
4	To educate various techniques used to synthesize and characterize smart materials
5	To identify the required smart material for distinct applications/devices
COURSE OUTCOMES	
At the end of the course the student will be able	
CO1	To recognize the need of smart materials
CO2	To understand the working principles of smart materials
CO3	To know different techniques used to synthesize and characterize smart materials
CO4	To exploit the properties of smart materials
CO5	To make use of smart materials for different applications

SYLLABUS

Credit: 3 **Hours of teaching: - 45 H**

UNITI : Introduction to Smart Materials: 9H

Historical account of the discovery and development of smart materials, Two phases: Austenite and Martensite, Temperature induced phase changes, Shape memory effect, Pseudoelasticity, One-way shape memory effect, Two-way shape memory effect.

UNIT II: Properties of Smart Materials: 9H

Physical principles of optical, Electrical, Dielectric, Piezoelectric, Ferroelectric, Pyroelectric and Magnetic properties of smart materials.

UNIT III: Synthesis of Smart materials: 9H

Solid state reaction technique, Chemical route: Chemical vapour deposition, Sol-gel technique, Hydrothermal method,Co-precipitaiton.Green synthesis, Mechanical alloying and Thin film deposition techniques: Chemical etching, Spray pyrolysis.

UNIT IV: Characterization Techniques: 9H

X-ray diffraction, Raman spectroscopy (RS), Fourier-transform infrared reflection (FTIR), UV-Visible spectroscopy, Scanning electron microscopy (SEM), Transmission electron microscopy, Atomic force microscopy (AFM) and Differential Scanning Calorimetry (DSC).

UNIT V:Smart Materials and Devices: 9H

Characteristics of shape memory alloys, Magnetostrictive, Optoelectronic, Piezoelectric, Metamaterials, Electro-rheological and Magneto-rheological materials and Composite materials.

Devices based on smart materials: Sensors & Actuators, MEMS and intelligent devices, Future scope of the smart materials.

Text Books:

1.Encyclopaediaof Smart Materials- Mel Schwartz, John Wiley & Sons, Inc.2002

2. Smart Materials and Structures - M. V. Gandhi and B.S. Thompson, Champman and Hall, 1992

Texts/References:

1. Smart Materials and Technologies- M. Addington and D. L. Schodek, , Elsevier, 2005.

2. Characterization and Application of smart Materials -R. Rai, Synthesis, , Nova Science, 2011. 3. Electroceramics: Materials, Properties, Applications -A.J. Moulson and J.M. Herbert, , 2nd Edn., John Wiley & Sons, 2003.

4. Piezoelectric Sensorics: Force, Strain, Pressure, Acceleration and Acoustic 1. Emission Sensors, Materials and Amplifiers,G.Gautschi, Springer, 2002.

5. Optical Metamaterials: Fundamentals and Applications-W. Cai and V. Shalaev, ,springer,2010.

6. Smart Materials and Structures - P. L Reece, New Research, Nova Science, 2007

NPTEL courses links

https://nptel.ac.in/courses/112/104/112104173/
https://nptel.ac.in/courses/112/104/112104251/

https://nptel.ac.in/content/storage2/courses/112104173/Mod_1_smart_mat_lec_1.pdf

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – III
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF H &SS

Course Code	**Employability Skills**		**L**	**T**	**P**	**C**
20A75501			**3**	**0**	**0**	**3**
Pre-requisite		**Semester-VII**				

Course Objectives:

- To encourage all round development of the students by focusing on productive skills
- To make the students aware of Goal setting and writing skills
- To enable them to know the importance of presentation skills in achieving desired goals.
- To help them develop organizational skills through group activities

To function effectively with heterogeneous teams

Course Outcomes (CO):

CO1: Define goals and try to achieve them
CO2: Understand the significance of self-management
CO3: Apply the knowledge of writing skills in preparing eye-catchy resumes
CO4: Analyse various forms of Presentation skills
CO5: Judge the group behaviour
CO6: Develop skills required for employability.

UNIT - I	Goal Setting and Self-Management	Lecture Hrs

Definition, importance, types of Goal Setting – SMART Goal Setting – Motivation – Intrinsic and Extrinsic Motivation – Self-Management - Knowing about self – SWOT Analysis

UNIT - II	Writing Skills	Lecture Hrs

Definition, significance, types of writing skills – Resume writing, E-Mail writing, Cover Letters, - E-Mail Etiquettes

UNIT - III	Technical Presentation Skills	Lecture Hrs

Nature, meaning & significance of Presentation Skills – Planning, Preparation, Presentation, Stage Dynamics – PPT & Poster Presentation

UNIT - IV	Group Presentation Skills	Lecture Hrs

Body Language – Group Behaviour - Team Dynamics – Leadership Skills – Personality Manifestation- Group Discussion

UNIT - V	Job Cracking Skills	Lecture Hrs

Nature, characteristics, importance & types of Interviews – Job Interviews – Skills for success - Answering Strategies – Mock Interviews

Textbooks:

- 1. Soft Skills & Employability Skills (English, Paperback, SABINA PILLAI, AGNA FERNANDEZ)Publisher: Cambridge

2.Personality Development and Soft Skills (English, Paperback, MitraBarun K.)

Reference Books:
1. Learning How To Fly - Life Lessons for the Youth (English, Paperback, Kalam Abdul A. P. J.), Rupa& Co 2. Personality Development and Soft Skills - Preparing for Tomorrow 1 Edition (English, Paperback, Shikha Kapoor)Publisher: Dreamtech Press 3. Skills for Employability - Skills for Employability with 0 Disc (English, Paperback, Dr. M. Sen Gupta)Publisher: Innovative Publication
Online Learning Resources:
7. https://youtu.be/gkLsn4ddmTs 8. https://youtu.be/2bf9K2rRWwo 9. https://youtu.be/FchfE3c2jzc 10. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – III
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF Chemistry

Subject Code	Title of the Subject	L	T	P	C
20A75301	**GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT**	2	1	-	3

COURSE OBJECTIVES	
1	Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry and the redesign of chemicals, industrial processes and products.
2	Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

COURSE OUTCOMES	
CO1	Apply the Green chemistry Principles for day to day life as well as synthesis, Describe the sustainable development and green chemistry, Explain economic and un-economic reactions, Demonstrate Polymer recycling.
CO2	Explain Heterogeneous catalyst and its applications in Chemical and Pharmaceutical Industries, Differentiate Homogeneous and Heterogeneous catalysis, Identify the importance of Bio and Photo Catalysis, Discuss Transition metal and Phase transfer Catalysis
CO3	Demonstrate Organic solvents and importance of solvent free systems, Discuss Super critical carbondioxide, Explain Super critical water and water as a reaction solvent, Interpret Ionic Liquids as Catalyst and Solvent
CO4	Describe importance of Biomass and Solar Power, Illustrate Sonochemistry and Green Chemistry, Apply Green Chemistry for Sustainable Development , Discuss the importance of Renewable resources
CO5	Discuss green Chemistry Principles for practicing Green nano synthesis, Illustrate Microwave Assisted Synthesis, Differentiate Hydrothermal and Reflux synthesis, Demonstrate Green Chemistry applications of Inorganic nanomaterials

SYLLABUS

UNIT 1: PRINCIPLES AND CONCEPTS OF GREEN CHEMISTRY

Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling.

UNIT 2: CATALYSIS AND GREEN CHEMISTRY

Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, Asymmetric Catalysis, Heterogeneous and Homogenous catalysts, Phase transfer catalysis: Hazard Reduction, C–C Bond Formation, Oxidation Using Hydrogen Peroxide, Bio-catalysis and photo-catalysis with examples,

UNIT 3: ORGANIC SOLVENTS: ENVIRONMENTALLY BENIGN SOLUTIONS

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbondioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalyst and solvent.

UNIT 4: EMERGING GREENER TECHNOLOGIES

Biomass as renewable resource, Energy: Fossil Fuels, Energy from Biomass, Solar Power, Other Forms of Renewable Energy, Fuel Cells, Chemicals from Renewable Feedstocks, Chemicals from Fatty Acids, Polymers from Renewable Resources, Some Other Chemicals from Natural Resources, Alternative Economies: The Syngas Economy, The Biorefinery, Design for energy efficiency, Industrial applications of alternative environmentally benign catalytic systems for carrying out the important reactions such as selective oxidation, reduction and C-C bond formations (specific reactions)

UNIT 5:ALTERNATIVE ENERGY SOURCES

Photo redox catalysis, single electron transfer reactions (SET), Advantages and Challenges Faced by Photochemical Processes, Examples of Photochemical Reactions, Chemistry Using Microwaves: Microwave Heating, Microwave-assisted Reactions, Sonochemistry: Sonochemistry and Green Chemistry, Electrochemical Synthesis: Examples of Electrochemical Synthesis.

Text Books :

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition,

   Oxford University Press, USA

References :

1. Green Chemistry for Environmental Sustainability, First Edition, Sanjay K. Sharma and Ackmez Mudhoo, CRC Press, 2010.
2. Edited by Alvise Perosa and Maurizio Selva , Hand Book of Green chemistry Volume 8:

   Green Nanoscience, wiley-VCH, 2013.

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – IV
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF Civil Engineering

		L	T	P	C
20A70105	**Environmental Impact Assessment**	**3**	**0**	**0**	**3**

Course Objectives:
1. To impart knowledge on different concepts of Environmental Impact Assessment.
2. To teach procedures of risk assessment.
3. To teach the EIA methodologies and the criterion for selection of EIA methods.
4. To teach the procedures for environmental clearances and audit.
5. To know the impact quantification of various projects on the environment.

Course Outcomes (CO):
1. To prepare EMP, EIS, and EIA report.
2. To identify the risks and impacts of a project.
3. To choose an appropriate EIA methodology.
4. To evaluation the EIA report.
5. To Estimate the cost benefit ratio of a project.

UNIT - I

Concepts and methodologies of EIA :Initial environmental Examination, Elements of EIA, - Factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters- Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT - II

Impact of Developmental Activities and Land Use :Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT - III

Assessment of Impact on Vegetation, Wildlife and Risk Assessment :Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation - Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-Advantages of Environmental Risk Assessment

UNIT - IV Environmental audit

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT - V Environmental Acts and Notifications

The Environmental protection Act, The water preservation Act, The Air (Prevention &Control of pollution Act), Wild life Act - Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- Evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000.

Textbooks:

1. Environmental Impact Assessment, by Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B. S. Publication, Hyderabad 2nd edition 2011

Reference Books:

1. Environmental Engineering, by Peavy, H. S, Rowe, D. R, Tchobanoglous, G.Mc-Graw Hill International Editions, New York 1985
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke, Prentice Hall Publishers
3. Environmental Science and Engineering, by Suresh K. Dhaneja, S.K., Katania& Sons Publication, New Delhi.
4. Environmental Pollution and Control, by H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi.

Online Learning Resources:

https://nptel.ac.in/courses/124107160

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – IV
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch
DEPARTMENT OF Electrical & Electronic & Engineering

Course Code	**IoT APPLICATIONS IN ELECTRICAL ENGINEERING (OE-IV)**		**L**	**T**	**P**	**C**
20A70205			**3**	**0**	**0**	**3**
Pre-requisite						

Course Objectives: To make the students learn about:

- Basics of Internet of Things and Micro Electro Mechanical Systems (MEMS) fundamentals in design and fabrication process.
- The concept of motion less and motion detectors in IoT applications.
- Applications of IoT in smart grid.
- The concept of Internet of Energy for various applications.

Course Outcomes (CO): After completing the course, the student should be able to do the following:

CO 1 Understand the concept of IoT in Electrical Engineering.
CO 2 Analyze various types of motionless sensors and various types of motion detectors
CO 3 Apply various applications of IoT in smart grid.
CO 4 Design future working environment with Energy internet.

UNIT - I	**SENSORS**	Lecture Hrs: 10

Definitions, Terminology, Classification, Temperature sensors, Thermoresistive, Resistance, temperature detectors, Silicon resistive thermistors, Semiconductor, Piezoelectric, Humidity and moisture sensors. Capacitive, Electrical conductivity, Thermal conductivity, time domain reflectometer, Pressure and Force sensors: Piezoresistive, Capacitive, force, strain and tactile sensors, Strain gauge, Piezoelectric

UNIT - II	**OCCUPANCY AND MOTION DETECTORS**	Lecture Hrs: 10

Capacitive occupancy, Inductive and magnetic, potentiometric - Position, displacement and level sensors, Potentiometric, Capacitive, Inductive, magnetic velocity and acceleration sensors, Capacitive, Piezoresistive, piezoelectric cables, Flow sensors, Electromagnetic, Acoustic sensors - Resistive microphones, Piezoelectric, Photo resistors

UNIT - III	**MEMS**	Lecture Hrs: 10

Basic concepts of MEMS design, Beam/diaphragm mechanics, electrostatic actuation and fabrication, Process design of MEMS based sensors and actuators, Touch sensor, Pressure sensor, RF MEMS switches, Electric and Magnetic field sensors

UNIT - IV	**IoT FOR SMART GRID**	Lecture Hrs: 8

Driving factors, Generation level, Transmission level, Distribution level, Applications, Metering and monitoring applications, Standardization and interoperability, Smart home		
UNIT - V	**INTERNET of ENERGY (IoE)**	Lecture Hrs: 10
Concept of Internet of Energy, Evaluation of IoE concept, Vision and motivation of IoE, Architecture, Energy routines, information sensing and processing issues, Energy internet as smart grid .		
Textbooks:		
1. Jon S. Wilson, Sensor Technology Hand book, Newnes Publisher, 2004 2. Tai Ran Hsu, MEMS and Microsystems: Design and manufacture, 1st Edition, Mc Grawhill Education, 2017 3. ErsanKabalci and YasinKabalci, From Smart grid to Internet of Energy, 1st Edition, Academic Press, 2019		
Reference Books:		
1. Raj Kumar Buyya and Amir VahidDastjerdi, Internet of Things: Principles and Paradigms, Kindle Edition, Morgan Kaufmann Publisher, 2016 2. Yen Kheng Tan and Mark Wong, Energy Harvesting Systems for IoT Applications: Generation, Storage and Power Management, 1st Edition, CRC Press, 2019 3. RMD SundaramShriram, K. Vasudevan and Abhishek S. Nagarajan, Internet of Things, Wiley, 2019		
Online Learning Resources:		
1. https://onlinecourses.nptel.ac.in/noc22_cs96/preview 2. https://nptel.ac.in/courses/108108123 3. https://nptel.ac.in/courses/108108179		

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – IV

IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF Mechanical Engineering

Subject Code	Title of the Subject	L	T	P	C
20A70305	**MATERIAL HANDLING EQUIPMENTS**	3	0	0	3

Course Objectives:

To understand how the knowledge of materials management can be an advantage to logistics and supply chain operations.

To sensitize the students on the materials management functions – Planning, Purchase, Controlling, Storing, Handling, Packaging, Shipping and Distributing, and Standardizing.

To realize the importance of materials both in product and service.

planning/ production and plant layouts, studying about strategies of material handling and equipments, and selection of site locations.

It also aims to explore the layout planning by computer applications following different algorithms.

UNIT-I

Overview of Material Handling: Principles of Material Handling, Principal groups of Material Handling equipment – General Characteristics and application of Material Handling Equipment, Modern trends in material handling.

UNIT-II

Lifting Equipments: Hoist- Components of Hoist – Load Handling attachments hooks, grabs and clamps – Grabbing attachments for bulk material – Wire ropes and chains.

UNIT-II

Lifting tackle pulleys for gain of force and speed: Tension in drop parts – Drums, Shears and sprockets – Arresting gear and brakes – Block brakes, Band brakes, thrust brakes – Safety and hand cranks. Principle operation of EOT, Gantry and jib cranes Hoisting Mechanisms, Travelling mechanisms, lifting mechanisms – Slewing Mechanisms – Elevators and lifts.

UNIT-IV

CONVEYORS: Types - description -applications of Belt conveyors, apron conveyors and escalators Pneumatic conveyors, Screw conveyors and vibratory conveyors

UNIT-V

ELEVATORS: Bucket elevators: Loading and bucket arrangements - Cage elevators - shaft way, guides, counter weights, hoisting machine, safety devices - Design of fork lift trucks.

Course Outcomes :

The students will be able to select appropriate location for establishing industrial plants by applying the concepts of location selection.

The students will be able to plan and design plant and production layouts through basic strategies and with computer applications.

The students will be able to identify and analyse the problems in the existing layout/ material handling system and shall be able to the optimize the layout/ material handling system

The students will be able to develop algorithms for new planning layouts for typical applications in the industries and Suggesting appropriate material handling strategies in the industries.

The students will be able to design of fork lift trucks.

REFERENCES

Rudenko, N., Materials handling equipment, ELnvee Publishers, 1970.

Spivakovsy, A.O. and Dyachkov, V.K., Conveying Machines, Volumes I and II, MIR Publishers, 1985.

Alexandrov, M., Materials Handling Equipments, MIR Publishers, 1981.

Boltzharol, A., Materials Handling Handbook, The Ronald Press Company, 1958.

P.S.G. Tech., “Design Data Book”, KalaikathirAchchagam, Coimbatore, 2003.

Lingaiah. K. and Narayana Iyengar, “Machine Design Data Hand Book”, Vol. 1 & 2, Suma Publishers,

Bangalore, 1983

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – IV
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch
DEPARTMENT OF Electronics & Communication Engineering

Course Code	PRINCIPLES OF DIGITAL SIGNAL PROCESSING	L	T	P	C
20A70405		3	0	0	3

Pre-requisite
Basics of Electronics and Communication Engineering

Course Objectives:
- To understand the frequency domain analysis of discrete time signals.
- To learn the properties of discrete Fourier series and Fourier transforms.
- To design &analyzeIIR digital filters from analog filters.
- To know various structures used in implementation of FIR digital filters.
- To grasp the importance and applications of Multirate Digital signal processing.

Course Outcomes (CO): At the end of this course, the students will be able to
- Articulate the frequency domain analysis of discrete time signals.
- Understand the properties of discrete Fourier series and Fourier transforms.
- Design &analyzeIIR digital filters from analog filters.
- Design various structures used in implementation of FIR digital filters.
- Summarize the importance and applications of Multirate Digital signal processing.

UNIT - I
Introduction to Digital Signal Processing: Discrete time signals & sequences, Classification of Discrete time systems, stability of LTI systems, LTI system Properties. Solution of Linear constant coefficient difference equations, frequency domain representation of discrete time signals and systems. Review of Z-transforms.

UNIT - II
Discrete Fourier Series and Fourier Transforms: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear filtering methods based on DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT - III
Design of IIR Digital Filters and Realizations: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

UNIT - IV

Design of FIR Digital Filters and Realizations: Characteristics of FIR Digital Filters, frequency response. Design of FIR digital filters using window techniques and frequency sampling techniques, comparison of IIR & FIR filters, basic structures of FIR systems.

UNIT - V

DSP Applications: Introduction to programmable DSPs, Multirate signal processing: Decimation, Interpolation, Sampling rate conversion by a rational factor; Adaptive filters: Introduction, Basic principles of Forward Linear Predictive filter and applications such as system identification, echo cancellation, equalization of channels, and beam forming using block diagram representation study only.

Textbooks:

1. John G. Proakis and Dimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithmsand Applications", Pearson Education, 2007.
2. A.V. Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing", PHI.

Reference Books:

1. Andreas Antoniou, "Digital Signal Processing", TATA McGraw Hill, 2006
2. MH Hayes, "Digital Signal Processing", Schaum's Outline series, TATA Mc-Graw Hill, 2007.
3. Robert J. Schilling and Sandra L. Harris, "Fundamentals of Digital Signal Processing using MATLAB", Thomson, 2007.
4. B. Venkataramani and M. Bhaskar, "Digital Signal Processors – Architecture, Programming and Applications", TATA McGraw Hill, 2002.

Online Learning Resources:

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – IV
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch
DEPARTMENT OF Computer Science & Engineering

Introduction to Database Management Systems

Course Code:20A70505 **L T P C : 3 0 0 3**

Course Objectives:

- To introduce the concept of Internet of Things.
- To Practice programs and build real time applications.
- Students will be explored to the interconnection and integration of the physical world.
- Students will gain practical experience in the development of Cloud-based IoT systems.
- To get knowledge on cloud platforms

Course Outcomes (CO):

CO1: Design reliable real time applications using microcontrollers and microprocessors .
CO2: Extend the programming functionality and design new modules.
CO3: Able to design & develop IOT Devices.

UNIT-I: Introduction

Introduction to database systems; Characteristics of databases, File system V/s Database system, Users of Database

system, approaches to building a database, data models, database management system, Data Independence, DBMS

system architecture, challenges in building a DBMS, various components of a DBMS

Introduction to database systems; Characteristics of databases, File system V/s Database system, Users of Database

system, approaches to building a database, data models, database management system, Data Independence, DBMS

system architecture, challenges in building a DBMS, various components of a DBMS

Introduction to database systems; Characteristics of databases, File system V/s Database system, Users of Database

system, approaches to building a database, data models, database management system, Data Independence, DBMSsystem architecture, challenges in building a DBMS, various components of a DBMS

Introduction to database systems; Characteristics of databases, File system V/s Database system, Users of Database

system, approaches to building a database, data models, database management system, Data Independence, DBMS

system architecture, challenges in building a DBMS, various components of a DBMS.

Introduction to database systems; Characteristics of databases, File system V/s Database system, Users of Database

system, approaches to building a database, data models, database management system, Data Independence,DBMS system architecture, challenges in building a DBMS, various components of a DBMS.

Introduction to database systems; Characteristics of databases, File system V/s Database system, Users of Database system, approaches to building a database, data models, database management system, Data Independence, DBMSsystem architecture, challenges in building a DBMS, various components of a DBMS.

Introduction to database systems, Characteristics of databases, File system V/s Database system, Users of Database system, approaches to building a database, data models, database management system, Data Independence, DBMS system architecture, challenges in building a DBMS, various components of a DBMS.

UNIT-II: E/R Model

Conceptual Data Modeling – motivation, entities, entity types, various types of attributes, relationships, relationship

types, Entity set types, Participation constraints, E/R diagram notation, Extended E/R Model, Examples

Conceptual Data Modeling – motivation, entities, entity types, various types of attributes, relationships, relationship

types, Entity set types, Participation constraints, E/R diagram notation, Extended E/R Model, Examples

Conceptual Data Modeling - motivation, entities, entity types, various types of attributes, relationships, relationship types, Entity set types, Participation constraints, E/R diagram notation, Extended E/R Model, Examples.

UNIT-III: Relational Data Model

Concepts of relations, schema-instance distinction, keys, referential integrity & foreign keys, converting the database specification in ER notation to the relational schema, Relational algebra operators: selection, projection, cross product, various types of joins, division, set operations, example queries, tuple relational calculus, domain relational calculus, Fundamentals of SQL.

UNIT-VI: Relational Database Design

Importance of a good schema design, problems encountered with bad schema designs, motivation for normal forms, dependency theory - functional dependencies, Armstrong's axioms for FD's, closure of a set of FD's, minimal covers, Normalization, Normal Forms - INF, 2NF, 3NF and BCNF, decompositions and desirable properties of them, multi valued dependencies and 4NF, join dependencies and 5NF, Concept of Denormalization.

UNIT-V: Transaction Processing,Data Storage & Indexing

Transaction processing and Error recovery-Concepts of transaction processing, ACID properties, concurrency control, Serializability, locking based protocols, Timestamp based protocols, recovery and logging methods.

Data Storage and Indexes - File organizations, primary, secondary index structures, various index structures - hasb based, dynamic hashing techniques, multi-level indexes, B and B-trees.

References:

3. K. A. Navas, “Electronics Lab Manual”, Volume I, PHI, 5th Edition, 2015, ISBN:9788120351424
4. Cyril Prasanna Raj P., “CMOS digital circuit design manual”, Volume 1, MSEC E-publication, Edition 2016

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Open Elective Course – IV

IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF Chemical Engineering

Course Code	SOLID WASTE MANAGEMENT	L	T	P	C
20A70805		3	0	0	3

Pre-requisite

Course Objectives:

- Material flow in society and generation of solid waste source
- Clarification of solid waste on characterization of the same
- Understand the sense of onsite handling storage and collection systems including transportation
- Understand processing technologies with mechanical volume reduction and thermal volume reduction corporate land filling, deep well injections.
- Learn to estimate material recovery energy recovery from a given waste data using case standing

Course Outcomes (CO):

At the end of the course, the student will be able to:

CO1 Identify sources and relationship between various functional elements of solid waste management and methods of storage and collection and transport of solid wastes.

CO2 Know the importance of transfer station and suggest suitable methods of solid waste disposal based on the composition of solid waste.

CO3 Suggest suitable methods for the management of plastic and E-wastes

CO4 Identify hazardous wastes and suggest suitable management techniques for radioactive wastes and Bio-medical wastes.

CO5 Adopt the suitable management method for a given industry

UNIT - I

Introduction: Definition, characteristics and perspectives of solid waste. Types of solid waste. Physical and chemical characteristics. Variation of composition and characteristics. Municipal, industrial, special and hazardous wastes.

General aspects Overview of material flow in society. Reduction in raw material usage. Reduction in solid waste generation. Reuse and material recovery. General effects on health and environment. Legislations

UNIT - II

Engineered systems: Typical generation rates. Estimation and factors effecting generation rates. On site handling. Storage and processing. Collection systems and devices. Transfer and transport.

UNIT - III

Processing Techniques: Mechanical volume reduction. Thermal volume reduction. Component separation. Land filling and land forming. Deep well injection.

UNIT - IV

Material recovery: Mechanical size alteration. Electromagnetic separation. Drying and dewatering. Other material recovery systems. Recovery of biological conversion products. Recovery of thermal conversion products.
Energy recovery: Energy recovery systems and efficiency factors. Determination of output and efficiency. Details of energy recovery systems. Combustion incineration and heat recovery. Gasification and pyrolysis. Refuse derived fuels (RDF).

UNIT - V

Case studies: Major industries and management methods used in typical industries – Coal fired power stations, textile industry, oil refinery, distillery, sugar industry, and radioactive waste generation units.

Textbooks:

1. Howard S. Peavy, Environmental Engineering, McGraw Hill International Edition, 1986.
2. Dutta, Industrial Solid Water Management and Land Filling Practice, Narose Publishing House, 1999.

Reference Books:

1. Sastry C.A., Waste Treatment Plants, Narose Publishing House, 1995.
2. Lagrega, Hazardous Waste Management, McGraw Hill, 1994.

Online Learning Resources:

JNTUA College of Engineering (Autonomous), Ananthapuramu

Open Elective Course – IV

IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF MATHEMATICS

Course Code	**Number theory and its Applications**		**L**	**T**	**P**	**C**
20A75102			**0**	**3**	**0**	**3**
Pre-requisite	**-----**	**Semester**	**I**			

Course Objectives:

This course enables the students to learn the concepts of number theory and its applications to information security.

Course Outcomes (CO): Student will be able to

- understand number theory and its properties.
- understand principles on congruences
- develop the knowledge to apply various applications
- develop various encryption methods and its applications.

UNIT - I	**Integers, Greatest common divisors and prime Factorization**	8 Hrs

The well-ordering property-Divisibility-Representation of integers-Computer operations with integers-Prime numbers-Greatest common divisors-The Euclidean algorithm -The fundamental theorem of arithmetic-Factorization of integers and the Fermat numbers-Linear Diophantine equations

UNIT - II	**Congruences**	8 Hrs

Introduction to congruences -Linear congruences-The Chinese remainder theorem-Systems of linear congruences

UNIT - III	**Applications of Congruences**	9 Hrs

Divisibility tests-The perpetual calendar-Round-robin tournaments-Computer file storage and hashing functions. Wilson's theorem and Fermat's little theorem-Pseudo primes- Euler's theorem- Euler's p hi-function- The sum and number of divisors- Perfect numbers and Mersenne primes.

UNIT - IV	**Finite fields & Primality, factoring**	8 Hrs
Finite fields- quadratic residues and reciprocity-Pseudo primes-rho method-fermat factorization and factor bases.		
UNIT - V	**Cryptology**	9 Hrs
Basic terminology-complexity theorem-Character ciphers-Block ciphers-Exponentiation ciphers- Public-key cryptography-Discrete logarithm-Knapsack ciphers- RSA algorithm-Some applications to computer science.		
Textbooks:		
1. Elementary number theory and its applications, Kenneth H Rosen, AT & T Information systems & Bell laboratories. 2. A course in Number theory & Cryptography, Neal Koblitz, Springer.		
Reference Books:		
1. An Introduction To The Theory Of Numbers, Herbert S. Zuckerman, Hugh L. Montgomery, Ivan Niven, wiley publishers 2. Introduction to Analytic number theory-Tom M Apostol, springer **3.** Elementary number theory, VK Krishnan, Universities press		
Online Learning Resources:		
https://www.slideshare.net/ItishreeDash3/a-study-on-number-theory-and-its-applications		

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Open Elective Course – IV

IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF Physics

Subject Code	Title of the Subject	L	T	P	C
20A75202	**SENSORS AND ACTUATORS FOR ENGINEERING APPLICATIONS**	3		-	3

COURSE OBJECTIVES	
1	To provide exposure to various kinds of sensors and actuators and their engineering applications.
2	To impart knowledge on the basic laws and phenomenon behind the working of sensors and actuators
3	To explain the operating principles of various sensors and actuators
4	To educate the fabrication of sensors
5	To explain the required sensor and actuator for interdisciplinary application
COURSE OUTCOMES	
At the end of the course the student will be able	
CO1	To recognize the need of sensors and actuators
CO2	To understand working principles of various sensors and actuators
CO3	To identify different type of sensors and actuators used in real life applications
CO4	To exploit basics in common methods for converting a physical parameter into an electrical quantity
CO5	To make use of sensors and actuators for different applications

SYLLABUS

Credits: 3 **Hours of teaching:- 45 H**

UNIT – I: Introduction to Sensors and Actuators **9H**

Sensors: Types of sensors:temperature, pressure, strain, active and passive sensors, General characteristics of sensors (Principles only), Materials used and their fabrication process: Deposition:ChemicalVapor Deposition, Pattern: photolithography and Etching: Dry and WetEtching.

Actuators: Functional diagram of actuators, Types of actuators and their basic principle of working: Hydraulic, Pneumatic, Mechanical, Electrical, Magnetic, Electromagnetic, Piezo-electric and Piezo-resistive actuators, Applications of Actuators.

UNIT –II: Temperature and Mechanical Sensors 9H

Temperature Sensors: Types of temperature sensors and their basic principle of working: Thermo-resistive sensors: Thermistors, Resistance temperature sensors, Silicon resistive sensors, Thermo-electric sensors: Thermocouples, PN junction temperature sensors

Mechanical Sensors: Types of Mechanical sensors and their basic principle of working: Force sensors: Strain gauges, Tactile sensors, Pressure sensors: Semiconductor, Piezoresistive, capacitive, Variable Reluctance Sensor (VRP).

UNIT –III: Optical and Acoustic Sensors 9H

Optical Sensors: Basic principle and working of: Photodiodes, Phototransistors and Photo-resistors based sensors, Photomultipliers, Infrared sensors:thermal, Passive Infra Red, Fiber based sensors and Thermopiles

Acoustic Sensors: Principle and working of Ultrasonic sensors, Piezo-electric resonators, Microphones.

UNIT –IV: Magnetic, Electromagnetic Sensors and Actuators 9H

Motors as actuators (linear, rotational, stepping motors), magnetic valves, inductive sensors (LVDT, RVDT, and Proximity), Hall Effect sensors, Magneto-resistive sensors, Magneto-strictive sensors and actuators, Voice coil actuators (speakers and speaker-like actuators).

UNIT –V: Chemical and Radiation Sensors 9H

Chemical Sensors: Principle and working of Electro-chemical, Thermo-chemical, Gas, pH, Humidity and moisture sensors.

Radiation Sensors: Principle and working of Ionization detectors, Scintillation detectors, Geiger-Muller counters, Semiconductor radiation detectors and Microwave sensors (resonant, reflection, transmission)

Text Books:

1. Sensors and Actuators – Clarence W. de Silva, CRC Press, 2nd Edition, 2015
2. Sensors and Actuators, D.A.Hall and C.E.Millar, CRC Press, 1999

Reference Books:

1.Sensors and Transducers- D.Patranabhis, Prentice Hall of India (Pvt) Ltd. 2003
2. Measurement, Instrumentation, and Sensors Handbook-John G.Webster, CRC press 1999
3. Sensors – A Comprehensive Sensors- Henry Bolte, John Wiley.
4. Handbook of modern sensors, Springer, Stefan Johann Rupitsch.
5. Principles of Industrial Instrumentation By D. Patranabhis

NPTEL courses links

https://onlinecourses.nptel.ac.in/noc21_ee32/preview

JNTUA College of Engineering (Autonomous), Ananthapuramu
Open Elective Course – IV
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF H & SS

Subject Code	Title of the Subject	L	T	P	C
20A79102	English Literary Spectrum	3		0	3

COURSE OBJECTIVES	
1	To develop aesthetic sense to appreciate the beauty of life
2	To introduce to Elizabethan drama and be able to appreciate the nuances of humour
3	To familiarize with Victorian novel and industrialization
4	To expose to the historical significance of ideas of different periods
5	To give exposure to the vicissitudes of life through short stories

COURSE OUTCOMES	
CO1	Awareness to lead a life of quality than quantity
CO2	Able to understand humour and Elizabethan culture
CO3	Enable to appreciate human relations in this mechanized world
CO4	Tolerant and receptive to different ideas
CO5	Be imaginative and understanding of human aspirations

SYLLABUS

UNIT I: Poetry

1. Ode to a Grecian Urn- John Keats
2. To a Skylark- P.B.Shelley
3. Satan's Speech from Paradise Lost Book I- 140-170 lines- John Milton
4. My Last Duchess- Robert Browning

UNIT II: Drama

1. Twelfth Night- William Shakespeare
   a) Elizabethan theatre
   b) Shakespearean tragedy
   c) Shakespearean Comedy
   d) Themes of Shakespearean Dramas

UNIT III: Novel

1. Hard Times- Charles Dickens

a) Rise of the English Novel
b) Victorian Novel
c) Utilitarianism
d) Humanism

UNIT IV: Prose

1. Of Studies – Francis Bacon
2. On Seeing People Off- A.G.Gardiner
3. Sweetness and Light- Mathew Arnold
4. I too have a Dream- Martin Luther King Junior

UNIT V: Short Stories

1. The Last Leaf- O.Henry
2. Useless Beauty- Guy de Maupassant
3. After the Dance – Leo Tolstoy
4. The Selfish Giant- Oscar Wilde

Text Books:

The Oxford Book of English Verse by Christopher Ricks (Editor)

Twelfth Night (2010 edition): Oxford School Shakespeare (Oxford School Shakespeare Series)

Dickens Charles, Hard Times (Penguin Classics)

The Art of the Personal Essay: An Anthology from the Classical Era to the Present, Anchor Books Publication

References:

Legois and Cazamian, *A History of English Literature*

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Open Elective Course – IV
IV B.TECH – I SEMESTER (R20) (common to all branches) - 2020 Admitted Batch

DEPARTMENT OF Chemistry

Subject Code	Title of the Subject	L	T	P	C
20A75302	**CHEMISTRY OF NANOMATERIALS AND APPLICATIONS**	2	1	-	3

COURSE OBJECTIVES	
1	To understand synthetic principles of Nanomaterials by various methods
2	And also characterisae the synthetic nanomaterials by various instrumental methods
3	To enumerate the applications of nanomaterials in engineering

COURSE OUTCOMES	
CO1	Classify the nanostructure materials, Describe scope of nano science and technology, Explain different synthetic methods of nano materials, Identify the synthetic methods of nanomaterial which is suitable for preparation of particular material
CO2	Describe the top down approach, Explain aerosol synthesis and plasma arc technique, Differentiate chemical vapour deposition method and electrodeposition method, Discuss about high energy ball milling.
CO3	Discuss different technique for characterization of nanomaterial, Explain electron microscopy techniques for characterization of nanomaterial, Describe BET method for surface area analysis, Apply different spectroscopic techniques for characterization
CO4	Explain synthesis and properties and applications of nanaomaterials, Discuss about fullerenes and carbon nanotubes, Differentiate nanomagnetic materials and thermoelectric materials, Describe liquid crystals
CO5	Illustrate applications of nanaomaterials, Discuss the magnetic applications of nanomaterials, list the applications of non-linear optical materials, Describe the applications fullerenes, carbon nanotubes

SYLLABUS

Unit – I

Basics and Characterization of Nanomaterials : Introduction**,** Scope of nanoscience and nanotecnology, nanoscience in nature, classification of nanostructured materials, importance of nano materials.

Unit – II

Synthesis of nanomaterials : Top-Down approach**,** Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling method.

Synthetic Methods**:** Bottom-Up approach**:-** Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

UNIT-III

Techniques for characterization: Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterilas, BET method for surface area analysis, dynamic light scattering for particle size determination-

UNIT-IV

Studies of Nano-structured Materials: Synthesis, properties and applications of the following nanomaterials, fullerenes, carbon nanotubes, core-shell nanoparticles, nanoshells, self- assembled monolayers, and monolayer protected metal nanoparticles, nanocrystalline materials, magnetic nanoparticles and important properties in relation to nanomagnetic materials, thermoelectric materials, non-linear optical materials and liquid crystals.

UNIT-V

Engineering Applications of Nanomaterials : Applications of Nano Particle, nano rods of nano wires, Fullerenes, carbon nano tubes, Graphines nanoparticles and other applications of nonmaterials and uses.

TEXT BOOKS:

1. **NANO: The Essentials:** T Pradeep, MaGraw-Hill, 2007.
2. **Textbook of Nanoscience and nanotechnology:** B S Murty, P Shankar, Baldev Rai, BB Rath and James Murday, Univ. Press, 2012.

REFERENCE BOOKS:

1. Concepts of Nanochemistry; Ludovico Cademrtiri and Geoffrey A. Ozin & Geoffrey A. Ozin, Wiley-VCH, 2011.
2. **Nanostructures & Nanomaterials; Synthesis, Properties & Applications:** Guozhong Cao, Imperial College Press, 2007.
3. **Nanomaterials Chemistry**, C. N. R. Rao, Achim Muller, K.Cheetham, Wiley-VCH, 2007.