TWO YEAR COURSE STRUCTURE

FOR

M.TECH – COMPUTER SCIENCE AND ENGINEERING

w.e.f.

2013-2014 ADMITTED BATCH

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

PULIVENDULA – 516390, Y.S.R. (DIST), ANDHRA PRADESH, INDIA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ,PULIVENDULA(AUTONOMUS)
PULIVENDULA -516390(A.P)India.

Course structure for M.Tech - I Semester COMPUTER SCIENCE ENGINEERING (Reg) with effective from 2013-14

S.NO	Course code	Subject Name	Theory/ Tutorial	Drawing/Lab	Credits
1	13D58101	Research Methodology	4		4
2	13D58102	Web Programming	4		4
3	13D58103	Open Source Systems	4		4
4	13D58104 13D58105	Elective -I a. ADVANCED DATABASE MANAGEMENT SYSTEMS b. Design Patterns c. CYBER LAWS	4		4
5	13D58107	Elective-II a. Object Oriented Software Engineering b. ENTERPRISE APPLICATION SYSTEMS c. ARTIFICIAL NEURAL NETWORKS	4		4
6	13D58108	Open Source Systems Lab		3	2
7	13D58109	Web Programming Lab		3	2
		Contact Periods /Week	20	6	
		Total	24		

M.Tech (CSE) I Year II Semester

S.NO	Course Code	Subject Name	Theory/ Tutorial	Drawing/Lab	Credits
1	13D58202	Advanced Network Technologies	4		4
2	13D58201	Simulation and Modeling	4		4
3	13D58203	Big Data Analytics	4		4
4	13D58207	Elective-III a. Software Architecture b. Computer Vision a. Semantic Web Mining	4		4
5	13D58204	Elective-IV a. Machine Learning b. Advanced Computing Technologies c. Software Auditing	4		4
6	13D58211	Big Data Lab		3	2
7	13D58210	Simulation Lab		3	2
		Contact Periods /Week	20	6	
		Total	24		

M.Tech (CSE) II Year I Semester

S.NO	Course Code	Subject	Maximum Marks		Total	Min. Marks/ Grades to Pass	Credits
			Internal	External			
1		Comprehensive Viva-Voce	50	-	50	25	2
2		Seminar-I	50	-	50	25	-

M.Tech (CSE) II Year II Semester

S.NO	Course Code	Subject	Maximum Marks		Total	Min. Marks/ Grades to Pass	Credits
			Internal	External			
1		Seminar-II	50	-	50	25	-
2		**Project Work** Grades : A, B, C, D A - Excellent B - Good C – Satisfactory D - Unsatisfactory	-	-	-	-	18

M.Tech. I-I Semester (C.S.E) **L T P C**

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RESEARCH METHODOLOGY

UNIT – I

Introduction to Research:

The hallmarks of scientific research – Building blocks of science in research – Concept of Applied and Basic research – Quantitative and Qualitative Research Techniques – Need for theoretical frame work – Hypothesis development – Hypothesis testing with quantitative data. Research design – Purpose of the study: Exploratory, Descriptive, Hypothesis Testing.

UNIT – II

Experimental Design:

Laboratory and the Field Experiment – Internal and External Validity – Factors affecting Internal validity. Measurement of variables – Scales and measurements of variables. Developing scales – Rating scale and attitudinal scales – Validity testing of scales – Reliability concept in scales being developed – Stability Measures.

UNIT – III

Data Collection Methods:

Interviewing, Questionnaires, etc. Secondary sources of data collection. Guidelines for Questionnaire Design – Electronic Questionnaire Design and Surveys. Special Data Sources: Focus Groups, Static and Dynamic panels. Review of Advantages and Disadvantages of various Data-Collection Methods and their utility. Sampling Techniques – Probabilistic and non-probabilistic samples. Issues of Precision and Confidence in determining Sample Size. Hypothesis testing, Determination of Optimal sample size.

UNIT – IV

Multivariate Statistical Techniques:

Data Analysis – Factor Analysis – Cluster Analysis – Discriminant Analysis – Multiple Regression and Correlation – Canonical Correlation – Application of Statistical (SPSS) Software Package in Research.

UNIT – V

Research Report:

Purpose of the written report – Concept of audience – Basics of written report – Concept of audience – Basics of written reports. Integral parts of a report – Title of a report, Table of contents, Abstract, Synopsis, Introduction, Body of a report – Experimental, Results and Discussion – Recommendations and Implementation section – Conclusions and Scope for future work.

REFERENCES:

1. Donald R. Cooper and Ramela S. Schindler, Business Research Methods, Tata McGraw- Hill Publishing Company Limited, New Delhi, 2000
2. Uma Sekaran, Research Methods for Business, John Wiley and Sons Inc., New York, 2000.
3. C.R.Kothari, Research Methodology, Wishva Prakashan, New Delhi, 2001.
4. Donald H.McBurney, Research Methods, Thomson Asia Pvt. Ltd. Singapore, 2002.
5. G.W.Ticehurst and A.J.Veal, Business Research Methods, Longman, 1999.
6. Ranjit Kumar, Research Methodology, Sage Publications, London, New Delhi, 1999.
7. Raymond-Alain Thie'tart, et.al., Doing Management Research, Sage Publications, London, 1999.
8. Research Methodology: A Step by Step Guide for Beginners, 2/e by Ranjith Kumar

9. Management Research Methodology: Integration of Principles, Methods and Techniques (For VTU), 1/e

M.Tech. I-I Semester (C.S.E) **L T P C**

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WEB PROGRAMMING

UNIT I

BASIC INTERNET CONCEPTS: Connecting to the Internet – Domain Name System - Exchanging E-mail – Sending and Receiving Files - Fighting Spam, Sorting Mail and avoiding e-mail viruses – Chatting and Conferencing on the Internet – Online Chatting - Messaging – Usenet Newsgroup –Internet Relay chat (IRC) – Instant Messaging - Voice and Video Conferencing.

UNIT II

WORLD WIDE WEB: Overview – Web Security, Privacy, and site-blocking – Audio and Video on the web – Creating and Maintaining the Web – Web site creation concepts – Web Page Editors – Optimizing Web Graphics – Web Audio Files – Forms, Interactivity, and Database- Driven Web sites – File Transfer and downloading – FTP – Peer to Peer – Downloading and Installing software.

UNIT III

JAVA FUNDAMENTALS: Java features – Java Platform – Java Fundamentals – Expressions, Operators, and Control Structures – Classes, Packages and Interfaces – Exception Handling.

UNIT IV

PACKAGES: AWT package – Layouts – Containers – Event Package – Event Model – Painting – Garbage Collection - Multithreading – Language Packages.

UNIT V

ADVANCED JAVA PROGRAMMING: Utility Packages – Input Output Packages – Inner Classes – Java Database Connectivity - Servlets - RMI – Java Beans.

TEXT BOOKS:

1. Margaret Levine Young, “Internet and WWW”, 2nd Edition, Tata McGraw Hill, 2002. (Unit 1 & 2)
2. Herbert Schildt, The Complete Reference – Java 2 , 4th Edition, Tata McGraw Hill, 2001. (Unit 3, 4 & 5)

REFERENCES:

1. Keyur shah, “Gateway to Java Programmer Sun Certification”, Tata Mc Graw Hill 2002.
2. Deitel & Deitel, Java How to Program, Prentice Hall 1999.

M.Tech. I-I Semester (C.S.E)

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OPEN SOURCE SYSTEMS

UNIT-I

An over view of Red Hat Linux, Installing Red Hat Linux, Setting up Apache Web Server, Setting up a MySQL Database server, Configuring PHP To Use MYSQL

Getting Started with PHP – Scripts, Types in PHP, Useful Functions.The PHP Language – Data Types, Type Conversions, Variables and Constants, Expressions and Operators, Control Structures. Code Organization and Reuse – Basic Code Reuse: Functions, Intermediate Code Reuse: Using and Including Files. Object-Oriented Programming – ExtendingObjects, Other Features.

Working with Arrays – Arrays Revisited, Iterating Over Elements in an Array, Multi-Dimensional Arrays, and Operations on Arrays.

Strings and Characters of the World – Strings and PHP, Character Sets and Unicode, Making Sense of It All in PHP, Configuring PHP for Unicode, Operating on Strings.

Interacting with the Server: Forms – Working with HTML Forms, Working with Server, Redirecting the User.

UNIT-II

Introduction to Databases – Basics, Motivations for Using a DBMS, Major Database Servers – How to Select a Database Server.

PHP and Data Access – Connecting and Authenticating, Executing Queries, Queries a Go-Go, Old-School Interfaces.

Web Applications and the Internet – A closer look at the WWW, Designing Web Applications

Implementing a User Interface – Considerations, Implementing your User Interface.

User Management – How users Connect to our Application, Visitors Versus Known Users, Validating Users.

Securing Your Web Applications: Planning and Code Security – Strategies for Dealing with Security, Identifying the Threats, Securing your Code.

Securing Your Web Applications: Software and Hardware Security – Securing Your Web Server and PHP, SSL, Database Security, Protecting the Network, Computer and Operating System Security.

UNIT-III

Error Handling and Debugging – How Errors Are Born, How PHP Manages Errors, Exceptions, Debugging.

Cookies and Sessions – Tasty and Useful, Sessions, Session Security.

User Authentication – Planning for Members: Web Server-Provided Authentication.

Advanced Output and Output Buffering – Globalization and Locales, Formatted Output, Output Buffering.

Data Validation with Regular Expressions – Using Regular Expressions, Data Validation with Regular Expressions, Other Regular Expression Functions.

UNIT-IV

Files and Directories – Accessing Files, Accessing Directories, Security Considerations.

File Uploading – Uploading User Files, A File-Uploading Example, Security Considerations.

Working with Dates and Times – Sources of Dates and Times, Dates and Times in PHP, More Dates and Times in Database Servers.

UNIT-V

Using PEAR – Introduction, Installation and Configuration, Basic Commands, Example: Using the Date Class.

Development and Deployment – Coding Standards, Source Code Control, Testing, Deployment.

Strategies for Successful Web Applications: Singleton Objects - Session Management – A Holistic Approach to Error Handling, Database Connection Management, PHP Configuration Settings.

TEXT BOOKS:

1. Red Hat Linux Bible by Christoopher Negus Wiley Dreamtech
2. Core Web Applications Development with PHP and MySQL by Marc Wandschneider

REFERENCES:

1. Beginning PHP5, Apache, MySQL Web Development by Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jermy Stolz, Michael K. Glass, Wiley Dreamtech (Wrox) 2006.
2. PHP5 and MySQL Bible by Tim Converse, Joyce Park, Clark Morgan Wiley India 2004.

M.Tech. I-I Semester (C.S.E)

ELECTIVE-I (A)
ADVANCED DATABASE MANAGEMENT SYSTEMS

UNIT-I

Algorithms for Query Processing and Optimization: Translating SQL queries into relational algebra-algorithms for external sorting-algorithms for select and join operations-algorithms for project and set operations-implementing aggregate operations and outer joins-combining operations using pipelining-using heuristics in query optimization.

Data base systems architecture and the system Catalog: System architectures for DBMSs, Catalogs for Relational DBMSs, System catalog information in oracle.

Practical database design and tuning: Physical Database Design in Relational Databases-an overview of Database Tuning in Relational systems

UNIT-II

Distributed DBMS Concepts and Design: Introduction-function and architecture of a Distributed DBMS-Distributed Relational Database Design-transparencies in a Distributed DBMS-Date's Twelve Rules for Distributed DBMS

Distributed DBMS-Advanced Concepts: Distributed Transaction Management-Distributed Concurrency Control-Distributed Deadlock Management-Distributed Database Recovery-The X/Open Distributed Transaction processing model-Replication Servers

UNIT-III

Introduction to Object DBMSs: Advanced Database Applications-Weaknesses of RDBMSs-Object oriented Concepts-Storing objects in a Relational Database-Next generation Database systems

Object-Oriented DBMSs-Concepts and Design : Introduction to Object-Oriented Data Models and DBMSs-OODBMS perspectives-Persistence-Issues in OODBMSs-The object Oriented Database System Manifesto-Advantages and Disadvantages of OODBMSs-Object oriented Database Design

UNIT-IV

Object-Oriented DBMSs-Standards and Systems: Object management group-Object Database Standard ODMG3.0, 1999-Object store

Object relational DBMSs: Introduction to Object-relational Database systems-the third generation Database manifesto-Postgres-an early ORDBMS-SQL3

UNIT-V

Emerging database technologies and applications: Mobile databases-multimedia databases-geographic information systems-genome data management

XML and Internet Databases: Structured, semi structured, and unstructured data-XML Hierarchical (Tree) Data model-XML documents, DTD and XML Schema-XML Documents and Databases-XML querying

Enhanced data models for advanced applications: Active database concepts and triggers-temporal database concepts-multimedia databases-introduction to deductive databases

TEXT BOOKS:

1. Database Systems: A practical approach to design, implementation and management-Thomas Connolly and Carolyn E.begg

2. Fundamentals of Database Systems, Elmasri Navrate, 5/e, Pearson Education.

REFERENCES:

1. Principles of Distributed Database Systems, Ozsu, 2/e, PHI.

M.Tech. I-I Semester (C.S.E)

ELECTIVE-I (B)

DESIGN PATTERNS

UNIT–I

Introduction: What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT-II

A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary.

UNIT-III

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

UNIT-IV

Structural Pattern Part-I: Adapter, Bridge, Composite.

Structural Pattern Part-II: Decorator, açade, Flyweight, Proxy.

UNIT-V

Behavioral Patterns Part-I: Chain of Responsibility, Command, Interpreter, Iterator.

Behavioral Patterns Part-II : Mediator, Memento, Observer, State, Strategy, Template Method ,Visitor, Discussion of Behavioral Patterns.

TEXT BOOK:

1. Design Patterns By Erich Gamma, Pearson Education.

REFERENCES:

1. Pattern’s in JAVA Vol-I By Mark Grand ,Wiley DreamTech.

2. Pattern’s in JAVA Vol-II By Mark Grand ,Wiley DreamTech.

3. JAVA Enterprise Design Patterns Vol-III By Mark Grand ,Wiley DreamTech.

4. Head First Design Patterns By Eric Freeman-Oreilly-spd

5. Design Patterns Explained By Alan Shalloway, Pearson Education.

M.Tech. I-I Semester (C.S.E)

ELECTIVE-I (C)
CYBER LAWS

UNIT – I

Introduction to Cyber Law Evolution of Computer Technology:

Emergence of Cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.

UNIT – II

Information technology Act : Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.

UNIT – III

Cyber law and related Legislation : Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Sections of Indian Penal Code, Relevant Sections of Reserve Bank of India Act, Law Relating To Employees And Internet, Alternative Dispute Resolution , Online Dispute Resolution (ODR).

UNIT – IV

Electronic Business and legal issues: Evolution and development in Ecommerce, paper vs paper less contracts E-Commerce models- B2B, B2C,E security. Application area: Business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends.

UNIT – V

Case Study On Cyber Crimes: Harassment Via E-Mails, Email Spoofing (Online A Method Of Sending E-Mail Using A False Name Or E-Mail Address To Make It Appear That The E-Mail Comes From Somebody Other Than The True Sender, Cyber Pornography (Exm.MMS),Cyber-Stalking.

TEXT BOOKS:

1 .K.Kumar," Cyber Laws: Intellectual property & E Commerce, Security", 1 st Edition, Dominant Publisher, 2011.

2. Rodney D. Ryder, "Guide To Cyber Laws", Second Edition, Wadhwa And Company, New Delhi, 2007.

3. Information Security policy &implementation Issues, NIIT, PHI.

REFERENCES:

1. Vakul Sharma, "Handbook Of Cyber Laws" Macmillan India Ltd, 2nd Edition, PHI, 2003.

2. Justice Yatindra Singh, "Cyber Laws", Universal Law Publishing, 1st Edition, New Delhi, 2003.

3. Sharma, S.R., "Dimensions Of Cyber Crime", Annual Publications Pvt. Ltd., 1st Edition, 2004.

4. Augastine, Paul T.," Cyber Crimes And Legal Issues", Crecent Publishing Corporation, 2007.

M.Tech. I-I Semester (C.S.E) **L T P C**

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ELECTIVE-II (A)

OBJECT ORIENTED SOFTWARE ENGINEERING

UNIT-I

Software & Software Engineering The nature of software, software engineering and as branch of engineering profession, stakeholders in software engineering, software quality, software engineering projects, Developing requirements Domain analysis, software project's starting point, problem definition and scope, What is requirement?, type of requirements, gathering and analyzing of requirements, requirements document types, reviewing, managing change in requirements,

UNIT-II

Modeling with classes

UML, essentials of UML class diagrams, associations and multiplicity, generalization, instance diagrams,

Using design patterns

Pattern introduction, the abstraction-occurrence pattern, general hierarchical pattern, the play-role pattern, the singleton pattern, the observer pattern, the delegation pattern, the adaptor pattern, the façade pattern, the immutable pattern, the read-only interface pattern and the proxy pattern.

UNIT-III

Focusing on users and their tasks

User-centred design, characteristics of users, developing use case models of systems, the basics of user interface design, usability principles, evaluation users interfaces

Modeling interactions and behavior

Interaction diagrams, state diagrams, activity diagrams

Architect ring and designing software

The process of design, principles leading to good design, techniques for making good design decisions, software architecture, writing a good design document

UNIT-IV

Testing and inspecting to ensure high quality

Basic definitions of defect, error and failure, effective and efficient testing, defects in ordinary and numerical algorithms, defects in timing and coordination, defects in handling stress and unusual situations, documentation defects, writing formal test cases and test plans, strategies for testing large software, inspections, quality assurance in general

UNIT-V

Managing the software process

Project management, software process model, cost estimation, building software engineering teams, project scheduling and tracking, contents of a project plan

TEXT BOOKS:

Object-Oriented Software Engineering Practical software development using UML and Java by Timothy C. Lethbridge & Robert Langaniere McGraw-Hill Co

M.Tech. I-I Semester (C.S.E)

ELECTIVE-II (B)
ENTERPRISE APPLICATION SYTEM

UNIT-I

Introduction to enterprise applications and their types, software engineering methodologies, life cycle of raising an enterprise application, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise applications

UNIT-II

Inception of enterprise applications, enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non functional requirements, requirements validation, planning and estimation

UNIT-III

Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture - design, different technical layers, best practices, data architecture and design – relational, XML, and other structured data representations, Infrastructure architecture and design elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture and design

UNIT-IV

Construction readiness of enterprise applications - defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and code coverage

UNIT-V

Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application.

TEXT BOOKS:

1. Raising Enterprise Applications – Published by John Wiley, authored by Anubhav Pradhan, Satheesha B. Nanjappa, Senthil K. Nallasamy, Veerakumar Esakimuthu

2. Building Java Enterprise Applications – Published by O'Reilly Media, authored by Brett McLaughlin

REFERENCES:

1. Software Requirements: Styles & Techniques – published by Addison-Wesley Professional
2. Software Systems Requirements Engineering: In Practice – published by McGraw-Hill/Osborne Media
3. Managing Software Requirements: A Use Case Approach, 2/e – published by Pearson
4. Software Architecture: A Case Based Approach – published by Pearson
5. Designing Enterprise Applications with the J2EE Platform (PDF available at- http://java.sun.com/blueprints/guidelines/designing_enterprise_applications_2e/)
6. Software Testing, 2/e – published by Pearson

SOFTWARE TESTING Principles and Practices – published by Oxford University Press

M.Tech. I-I Semester (C.S.E)

ELECTIVE-II (C)
ARTIFICIAL NEURAL NETWORKS

UNIT – I

Introduction - Trends in computing, Pattern and data, Pattern recognition methods. Basics of Artificial Neural Networks - Characteristics of neural networks, Historical development, Terminology, Models of neuron, Topology, Basic learning laws. Activation and Synaptic Dynamics - Activation dynamics models, Synaptic dynamics models, Learning methods, Stability and Convergence, Recall in neural networks.

UNIT – II

Functional Units of ANNs for Pattern Recognition Tasks - Pattern recognition problem, Basic types of ANNs, Various pattern recognition tasks performed by ANNs. Feed-forward Neural Networks - Analysis of - Pattern associative networks, Pattern classification networks, Pattern mapping networks.

UNIT – III

Feed-back Neural Networks - Linear auto associative FF networks, Pattern storage networks, Stochastic networks, and Simulated annealing; Boltzmann machine.

UNIT – IV

Competitive Learning Neural Networks - Components of a competitive learning neural network, Analysis of feedback layer for different output functions, Analysis of pattern clustering networks, Analysis of feature mapping networks.

Architecture for Complex Pattern Recognition Tasks - Associative memory, Pattern mapping, Stability-Plasticity dilemma, Adaptive resonance theory, Temporal patterns, Pattern variability - Neocognitron.

UNIT – V

Applications of ANNs - Pattern classification - character recognition, Associative memories - content addressable memory, Information retrieval; Optimization - Linear programming problem, Traveling salesman problem, Smoothing images with discontinuities; Vector quantization, Control applications, Applications in speech, image processing and decision making.

TEXT BOOKS:

1 Yegnanarayana B, Artificial Neural Networks, PHI, 2004.
2 Satish Kumar, Neural Networks: A Class Room Approach, Tata McGraw-Hill, 2004.

REFERENCES:

1 Haykin S, Neural Networks and Learning Machines, 3rd edition, Prentice Hall, 2008.

2 Bishop C M, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
3 Hagan M T, Demuth H B, and Beale M, Neural Network Design, Thomson Learning, 1996.

M.Tech. I-I Semester (C.S.E)

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OPEN SOURCE SYSTEMS LAB

1. Demonstrate the configuration of Apache, MySQL and PHP.
2. Write PHP Script to demonstrate String processing and regular Expressions in PHP.
3. Program to demonstrate Object Oriented features of PHP.
4. Write Script that takes user input data and validates it and write the data into the database.
5. Program to demonstrate DML commands in MySQL.
6. Program to demonstrate exception handling in PHP.
7. Program to demonstrate Passing of Information between Web pages.
8. Program to demonstrate the use of Cookies.
9. Program to demonstrate user management and authentication.
10. Program to demonstrate file Uploading.
11. Program to demonstrate source code control and Testing.

M.Tech. I-I Semester (C.S.E) **L T P C**

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WEB PROGRAMMING LAB

1. Studying internet connections
2. Sending and receiving mails from one or more email clients
3. Video conferencing and installing software's(Example: Java) and setting up path and class path
4. Using FTP
   Creating of web site with forms, frames, linkes, tables etc with any web page editors and using
   Images and audio files as part of web pages
5. Writing JAVA programming by making use of class, interface, package, etc for the following
   a) Different types of inheritance study
   b) Uses of 'this' keyword
   c) Polymorphism
   d) Creation of user specific packages
   e) Creation of jar files and using them
   f) User specific exception handling
6. Writing window based GUI applications using frames and applets such as calculator application,
   Fahrenheit Centigrade conversion etc
7. Application of thread examples
8. Reading and writing text files
9. Reading image files and manipulating them with image related classes and methods
10. Writing and RMI application to access a remote method
11. Writing a servlet program with database connectivity for web based application such as student result
    Status checking, PNR number enquiry etc
12. Creation and usages of java bean

M.Tech. I-II Semester(C.S.E)

Advanced Network Technologies

UNIT- I

Fundamentals of wireless communications technology, The Electromagnetic Spectrum, Radio propagation mechanisms, Characteristics of the wireless channels, modulation techniques

Wireless LANs and PANs: Introduction, Fundamentals of WLANs, IEEE 802.11 standard, Bluetooth Wireless in local Loop, IEEE 802.16 standard

UNIT-II

Wireless Internet: Introduction, What is Wireless Internet, Mobile IP, TCP in Wireless Domain, WAP

AD HOC Wireless Networks: Introduction, Issues in Ad Hoc wireless networks, Ad Hoc Wireless Internet

MAC Protocol for Ad Hoc wireless Networks: Introduction, Issues in Designing a MAC Protocol for Ad Hoc wireless networks, Design goals of a MAC Protocol for Ad Hoc wireless networks, Classification of MAC Protocols, Connection based protocols, Connection based protocols with Reservation based mechanism, Connection based MAC protocols with scheduling mechanism

UNIT-III

Routing Protocols for Ad Hoc Wireless Networks: Introduction, Issues in Designing a Routing Protocol for Ad Hoc wireless networks, Classification of Routing Protocols, Table-driven Routing Protocol, on-demand Routing Protocol, Hybrid Routing protocol, routing protocol with Efficient Flooding mechanism, Hierarchical Routing protocol , Power-Aware Routing protocol

UNIT-IV

Transport Layer and Security Protocols for Ad Hoc Wireless Networks: Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc wireless networks, Design goals of a Transport Layer Protocol for Ad Hoc wireless networks, Classification of Transport Layer Solutions, TCP over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc wireless Networks: Application Controlled Transport Protocol, Ad Hoc Transport protocol, Security in Ad Hoc Wireless Networks, Network security requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management , Secure Routing in Ad Hoc Wireless Networks.

UNIT-V

Quality Of Service in Ad Hoc Wireless Networks: Introduction, Issues and challenges in providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions, QOS Frameworks for Ad Hoc Wireless Networks.

Wireless Sensor Networks: Introduction, Sensor Network Architecture, Data dissemination, Data gathering, MAC Protocols for sensor Networks, Location Discovery, Quality of sensor networks, Evaluation standards, other issues.

TEXT BOOKS:

1. “Ad Hoc Wireless Networks- architecture and Protocols”- C Siva Ram Murthy,B.S.Manoj, Pearson Edition.

REFERENCES:

1. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks”, Morgan Kaufman Publishers, 2004.
2. C.K.Toh, “Ad Hoc Mobile Wireless Networks”, Pearson Education, 2002.

3. Thomas Krag and Sebastin Buettrich, “Wireless Mesh Networking”, O’Reilly Publishers, 2007.

M.Tech. I-II Semester (C.S.E) **L T P C**
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SIMULATION AND MODELING

UNIT-I

Introduction to Simulation: System and System environment, Components of system, Type of systems, Type of models, Steps in simulation study, Advantages and Disadvantages of simulation.

General Principles: Concepts of discrete event simulation, List processing.

UNIT-II

Queueing Models: Characteristics of Queueing systems, Queueing notations, Long run measures of performance of Queueing systems, Steady state behavior of infinite population Markovian models, Steady state behavior finite population model, Network of Queues.

UNIT-III

Random Number Generation: Properties of random numbers, Generation of pseudo random numbers, Techniques for generating random numbers, Tests for random numbers. **Random Variate Generation:** Inverse transform technique, Convolution method, Acceptance rejection techniques Input Modeling: Data Collection, Identifying the Distribution of data, Parameter estimation, Goodness of fit tests, Selection input model without data, Multivariate and Time series input models.

UNIT-IV

Verification and Validation of Simulation Model: Model building, Verification, and Validation, Verification of simulation models, Calibration and Validation of models. **Estimation of Absolute Performane:** Types of simulations with respect to output analysis, Stochastic nature of output data, Measure of performance and their estimation, Output analysis of terminating simulators, Output analysis for steady state simulation Comparison and Evaluation of Alternative System.

UNIT-V

Simulation of Networked Computer Systems: Simulation tools, model input, mobility models in Wireless systems, OSI stack model, Physical Layer (PL) in Wireless systems, MAC, Data Link Layer, TCP, Model Construction.

TEXT BOOKS

1. Jerry Banks, John Carson, Barry Nelson, David Nicol, “Discrete Event System Simulation”.
2. Averill Law, W. David Kelton, “Simulation Modeling and Analysis”, McGRAW- HILL.
3.Banks J., Carson J. S., Nelson B. L., and Nicol D. M., .Discrete Event System Simulation., 3rd edition, Pearson Education, 2001.

REFERENCES

1. Geffery Gordon, “System Simulation”, PHI.
2. Bernard Zeigler, Herbert Praehofer, Tag Gon Kim, “Theory of Modeling and Simulation”, Academic Press .
3. Narsing Deo, “System Simulation with Digital Computer”, PHI.
4. Donald W. Body, “System Analysis and Modeling”, Academic Press Harcourt In

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Big Data Analytics

UNIT-I

Introduction to Big Data. What is Big Data. Why Big Data is Important. Meet Hadoop. Data. Data Storage and Analysis. Comparison with other systems. Grid Computing. A brief history of Hadoop. Apache hadoop and the Hadoop EcoSystem. Linux refresher; VMWare Installation of Hadoop.

UNIT-II

The design of HDFS. HDFS concepts. Command line interface to HDFS.Hadoop File systems. Interfaces. Java Interface to Hadoop. Anatomy of a file read. Anatomy of a file writes. Replica placement and Coherency Model. Parallel copying with distcp, Keeping an HDFS cluster balanced.

UNIT-III

Introduction. Analyzing data with unix tools. Analyzing data with hadoop. Java MapReduce classes (new API). Data flow, combiner functions, Running a distributed MapReduce Job. Configuration API. Setting up the development environment. Managing configuration. Writing a unit test with MRUnit. Running a job in local job runner. Running on a cluster.Launching a job. The MapReduce WebUI.

UNIT-IV

Classic Mapreduce. Job submission. Job Initialization. Task Assignment. Task execution .Progress and status updates. Job Completion. Shuffle and sort on Map and reducer side. Configuration tuning. Map Reduce Types. Input formats. Output formats, Sorting. Map side and Reduce side joins.

UNIT-V

The Hive Shell. Hive services. Hive clients. The meta store. Comparison with traditional databases. Hive Ql. Hbasics. Concepts. Implementation. Java and Map reduce clients. Loading data, web queries.

Text Books:

1. Tom White, Hadoop,"The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012.

2. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch ,"Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012.

M.Tech. I-II Semester (C.S.E) **L T P C**
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ELECTIVE-III(A)

Software Architecture

UNIT-I

Basic Concepts- Concepts of Software Architecture, Models, Processes, Stakeholders.
Designing Architectures- The Design Process, Architectural Conception.
Refined Experience in Action: Styles and Architectural Patterns, Architectural Conception in Absence of Experience.

UNIT-II

Modeling- Modeling Concepts, Ambiguity, Accuracy, and Precision, Complex Modeling: Mixed Content and Multiple Views, Evaluating Modeling Techniques, Specific Modeling Techniques.

UNIT-III

Analysis- Analysis Goals, Scope of Analysis, Architectural Concern being Analyzed, Level of Formality of Architectural Models, Type of Analysis, Analysis Techniques.

UNIT-IV

Implementation and Deployment- Concepts, Existing Frameworks, Software Architecture and Deployment, Software Architecture and Mobility
Conventional Architectural styles- Pipes and Filters, Event- based, Implicit Invocation, Layered systems, Repositories, Interpreters, Process control.

UNIT-V

Applied Architectures and Styles-Distributed and Networked Architectures, Architectures for Network-Based Applications, Decentralized Architectures, Service-Oriented Architectures and Web Services.

Text Books

1. .Software Architecture: Foundations, Theory, and Practice. by Richard N. Taylor, Nenad Medvidovic, Eric Dashofy , ISBN: 978-0-470-16774-8

2. M. Shaw: Software Architecture Perspectives on an Emerging Discipline, Prentice-Hall.

3. Len Bass, Paul Clements, Rick Kazman: Software Architecture in Practice, Pearson

References

1. Pattern Oriented Software Architecture. By Frank Buchnan etal, Wiley India.

2. The Art of Software Architecture. By Stephen T. Albin.

M.Tech. I-II Semester (C.S.E)

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ELECTIVE-III (B)

Computer Vision

UNIT-I

Recognition Methodology: Conditioning, Labeling, Grouping, Extracting, Matching.

Morphological Image Processing: Introduction, Dilation, Erosion, Opening, Closing,Hit-or-Miss transformation, Morphological algorithm operations on binary images, Morphological algorithm operations on gray-scale images, Thinning, Thickining , Region growing, region shrinking.

UNIT-II

Image Representation and Description: Representation schemes, Boundary descriptors, Region descriptors.

Binary Machine Vision: Thresholding, Segmentation, Connected component labeling, Hierarchal segmentation, Spatial clustering, Split & merge, Rule-based Segmentation, Motion-based segmentation.

UNIT-III

Area Extraction: Concepts, Data-structures, Edge, Line-Linking, Hough transform, Line fitting, Curve fitting (Least-square fitting).

Region Analysis: Region properties, External points, Spatial moments, Mixed spatial gray-level moments, Boundary analysis: Signature properties, Shape numbers.

UNIT-VI

Facet Model Recognition: Labeling lines, Understanding line drawings, Classification of shapes by labeling of edges, Recognition of shapes, Consisting labeling problem, Back-tracking Algorithm.

UNIT-V

Perspective Projective geometry, Inverse perspective Projection, Photogrammetry - from 2D to 3D, **Image matching:** Intensity matching of ID signals, Matching of 2D image, Hierarchical image matching.

Object Models And Matching: 2D representation, Global vs. Local Features.

Text Books

1.Robert Haralick and Linda Shapiro, "Computer and Robot Vision", Vol I, II, Addison-Wesley, 1993.

2. David A. Forsyth, Jean Ponce, "Computer Vision: A Modern Approach".

References

3. 1. Milan Sonka,Vaclav Hlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision" Thomson Learning

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ELECTIVE-III (C)
Semantic Web Mining

UNIT I - INTRODUCTION
The world of the semantic web-WWW-meta data-Search engine-Search engine for traditional web-Semantic web-Search engine for semantic web-Traditional web to semantic web.

UNIT II - SEMANTIC WEB TECHNOLOGY
RDF-Rules of RDF-Aggregation-Distributed information-RDFS-core elements of RDFS Ontology-Taxonomy-Inferencing based on RDF schema

UNIT III - OWL
OWL-Using OWL to define classes-Set operators-Enumerations-Define properties ontology Matching-Three faces of OWL-Validate OWL.

UNIT IV- SWOOGLE
Swoogle-FOAF-Semantic mark up-Issues-prototype system-Design of Semantic web search- -----engine-Discovery and indexation-prototype system-case study.

UNIT V - SEMANTIC WEB SERVICES
Semantic web services-OWL-S-Upper ontology-WSDL-S,OWL-S to UDDI mapping ,Design of the search engine, implementations.

REFERENCES

1. Liyang Yu , "*Introduction to the Semantic Web and Semantic web services*" Chapman & Hall/CRC, Taylor & Francis group, 2007.

2. Johan Hjelm, "*Creating the Semantic Web with RDF*", Wiley,2001.

3. Grigoris Antoniou and Frank van Harmelen, "*A Semantic Web Primer*", MIT Press, 2012.

M.Tech. I-II Semester (C.S.E) **L T P C**
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ELECTIVE-IV(A)

Machine Learning

UNIT I

INTRODUCTION - Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning.

Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

UNIT II

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning.

Artificial Neural Networks – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

UNIT III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm.

Computational learning theory – Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The mistake bound model of learning - **Instance-Based Learning-** Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning

Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

UNIT IV

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution.

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge.

UNIT V

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators.

Reinforcement Learning – Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming.

TEXT BOOKS

1. Machine Learning – Tom M. Mitchell, - MGH.

2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC).

REFERENCE BOOKS

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.

2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001.

3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.

M.Tech. I-II Semester (C.S.E) **L T P C**
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Simulation Lab

1. Write a sub-routine which prints out the current time slot. In a time-slotted system, write a program which executed the sub-routine at time slot 1, 7, 1131, 24, and 47 by

    a. Using time-driven simulation
    b. Using event-driven simulation

2. Write a Tcl simulation script which prints the input arguments on screen. Format the output such that each line contains only one input argument. Run NS2 to test your program.

3. Write a program "hello", which prints "Hello NS2 Users!" on the screen
    a. Using C Language
    b. Using C++. Define at least one class
    c. Using a make utility to create an executable file. Make changes in your C++ and/or header files. Run the make utility. Does the utility re-compile and recreate an executable file for your program?

4. Write an NS2 statement which creates a SimpleLink object whose bandwidth is 2 Mbps, propagation delay is 10 ms, and the queue type is DropTail.

5. Design a new packet header which can record a collection of time values. Pass the packet with new header through a network. When the packet enters a LinkDelay object, add the current simulation time into the time value collection and print out all the values in the collection.

6. Write C++ statements to perform the following tasks:
    a. Show the following information for a packet *p on the screen: Size, Source and Destination IP addresses and ports, Payload type, and flow ID,
    b. Create a new packet.
    c. Destroy the packet *p.

7. Design a connection-oriented transport layer protocol in NS2. This protocol sets up the connection in the same way as TCP does, but transmit data packets in the same way as UDP does. Incorporate the protocol into NS2 and write a program to test the developed module.

8. Let $n1 and $n2 be two nodes and let $ns be the Simulator.
    a. Create an FTP agent to transfer a file with size 10 Mbytes from Node $n1 to Node $n2. Observe step-by-step how data are generated, traverse the network, arrive Node $n2, and are destroyed.
    b. Create a CBR traffic from Node $n1 to Node $n2. Set the packet size to 100 bytes and bit rate to 4 kbps. Observe the packet flow mechanism includes timing mechanism (i.e., when and how much the application sends out data).

9. Develop an application which has two stages. At the heavy-traffic stage, the application continuously provide data to the agent. At the light-traffic stage, it generates packets in the same way that CBR does. Design an experiment, and run simulation to test your developed application.

10. Use the NS2 independent utilities to create the following OTcl statements:

a. Five Mobile Nodes, each with speed uniformly distributed between 10 and 20 m s^{-1}, and constant pause time of 20 s. The geographical area is set to be 700 on both X-axis and Y-axis

b. Test for the above settings, Create at most four TCP connections.

Test your OTcl statements by running simulation.

11. Design a link with a round-robin packet scheduler and an ARQ-based error control mechanism.

12. Implement the packet scheduler as a component in a node with wired and wireless networks.

13. A weighted Fair Queue (WFQ) packet scheduler gives fair access to every data flow. Under a WFQ packet scheduler, each data flow gains channel access in proportion to its weight. Develop a module for a WFQ packet scheduler. Validate the module by plotting the results in a graph.

14. Set up a simulation for a wireless network with ten nodes which runs AODV as the routing protocol.
a. Using wireless (i.e., CMU) tracing, compute end-to-end throughput averaged over all the nodes.
b. Using new wireless tracing, plot the energy level of node 1.

15. Consider a two state error model, which consists of good and bad states. Packet transmission in a good state is always error free, while packet transmitted in a bad state is always corrupted. The time that an error model stays in good and bad states is exponentially distributed with means t_{good} and t_{bad}, respectively. Write a simulation script for the above two state error model with t_{good} = 10 sand t_{bad} = 1s. Verify the results and show the convergence time.

16. Consider a ball color-number matching experiment, where balls are fed one-by-one to an observer. Each ball is masked with a color and a number. The color can be either black or white, while the unique number is increased one-by-one as the balls are fed to the observer. From time to time, the observer is given a number and is asked to identify the
color of one of the 64 most recently observed balls. Design a memory-friendly approach for the observation.

M.Tech. I-II Semester (C.S.E)

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BIGDATA LAB

1)Install and run Hadoop using Stand-Alone Systems.
2)Install and run Hadoop using cluster.
3)Scale a simple program manually and scale the same program using Map-Reduace.
4)Write a program to count words in a program using map and reduce functions and Hadoop.
5)Write a program to implement streaming in Hadoop and execute
6)Write a program to implement mapper interface
7)write aprogram to project different columns of inputdata to different files,using map() and reduce() functions
8)illustrate moving data into HDFS through S3
9)Illustrate installation and running of Pig
10)Illustrate installation and configuring of Hive

TWO YEAR COURSE STRUCTURE

FOR

M.TECH – COMPUTER SCIENCE AND ENGINEERING

w.e.f.

2017-2018 ADMITTED BATCH

R-17 REGULATIONS

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

PULIVENDULA – 516390, Y.S.R. (DIST), ANDHRA PRADESH, INDIA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA – 516 390 (A. P.)

Academic regulations for M. Tech. (Regular) program
with effect from academic year 2017-18

1. ELIGIBILITY FOR ADMISSION:

Admission to the above program shall be made subject to the eligibility, qualification and specialization prescribed by the University for each Program from time to time.

i. Admission shall be made either on the basis of merit/rank obtained by the qualifying candidates in GATE/PGECET or otherwise specified, whichever is relevant.

2. AWARD OF M.TECH. DEGREE:

A student will be declared eligible for the award of the M. Tech. degree if he/she fulfills the following academic regulations:

i. He/she has pursued a course of study for not less than four semesters and not more than eight semesters.
ii. Students, who fail to fulfill all the academic requirements for the award of the degree within eight semesters from the year of their admission, shall forfeit their seat in the course and their seat shall stand cancelled.
iii. Register for 68 credits and secure all 68 credits

3. COURSES OFFERED:

s.no.	Department	Specialization
01.	Electrical & Electronics Engineering (EEE)	*Electrical Power Systems (EPS)*
02.	Mechanical Engineering (ME)	*Computer Aided Design & Computer Aided Manufacturing (CAD&CAM)*
03.	Electronics & Communication Engineering (ECE)	*Digital Electronics & Communication Systems (DECS)*
04.	Computer Science & Engineering (CSE)	*Computer Science & Engineering (CSE)*

And any other course as approved by the competent authorities from time to time.

4. COURSE WORK:

The programs are offered on a Semester basis consisting of four Semesters.

i. The candidates shall undergo ***fivetheory*** and ***two laboratory*** courses in ***each semester*** during the first and second semesters. During the third and fourth semesters the candidates pursue the dissertation in the concerned specialization only. The theme of dissertation should conform to the specialization.
ii. There shall be one comprehensive online examinations conducted by the respective department one at the end of 1st year with 60 objective questions for 60 marks on the subjects studied in the respective years of both semesters. The heads of the respective department are given the responsibility of preparing question paper and conducting the online examination by maintaining confidentiality. A student shall acquire Two credit assigned to the online examination only when he/she secure 40% or more marks. In case, if a student fails in comprehensive online examination, he shall re- register by following a similar procedure adopted for the lab examinations.

iii. There shall be ***two seminars***(*seminar-I, and seminar -II*) related to thesis/dissertation. Out of two seminars related to thesis/dissertation, *seminar-I* shall be conducted in the 3rd semester and the *seminar-II* will be in 4th semester.

iv. A candidate has to either present a paper in any national or international conference organized by AICTE recognized college/institution, or, publish a paper in peer-reviewed journals/Conferences proceedings before the submission of thesis.

v. Only on completion of all the prescribed courses, the candidate will be permitted to submit the thesis/dissertation. Three copies of the thesis / dissertation certified by the concerned supervisor in the prescribed form shall be submitted to the College. Once a student fails to submit the thesis within the stipulated period of four semesters, extension of time up to eight semesters may be permitted by the Principal with recommendation of the College Academic Committee.

vi. The Thesis/Dissertation will be adjudicated by one external examiner from reputed institutions/industry appointed by the competent authority.

vii. If the report of the external examiner is favorable, a viva-voce examination shall be conducted by a board consisting of Head of the department as Chairman, the supervisor and the examiner who adjudicated the thesis/ dissertation. The board shall jointly report the candidate's work as:

A - Excellent
B - Good
C - Satisfactory
D - Unsatisfactory

viii. If the report of the viva-voce is not satisfactory, the candidate will retake the viva-voce examination after three months. If he/she fails to get a satisfactory report at the second viva-voce examination, he/she will not be eligible for the award of the degree unless the candidate is asked to revise and resubmit the thesis/dissertation. The resubmitted copy shall be evaluated by the same board.

5. EVALUATION:

The performance of the candidate in each semester program shall be evaluated subject wise, with a maximum of 100 marks for theory and 100 marks for practical examination, on the basis of Internal Evaluation and End Examination.

i. For the theory subjects, 60% of the marks will be for the End Examination and 40% of the marks will be for Internal Evaluation.

Final Internal marks for a total of 40 marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage to the better mid exam and 20% to the other. The two midterm examinations shall be held during the semester, one in the middle of the program and the other one during the last week of instruction. **A student shall answer all three questions in 2 hours of time without seeking any choice**.

The following pattern shall be followed in the End-Examination.

a. Five questions shall be set from each of the five units with either/or type for 12 marks each, and the total marks of 60.
b. All the questions have to be answered compulsorily.
c. Each question may consist of one, two or more bits.

ii. For practical subjects, 60 marks shall be for the End Examinations and 40 marks will be for internal evaluation based on the day to day performance. The end semester practical examination shall be conducted by the concerned laboratory teacher and senior expert in the same subject of the department nominated by the Principal.

iii. Comprehensive Online Examination shall be evaluated for 60 marks ad seminar-I and seminar-II shall be evaluated for internal marks of 50 each. There is no external evaluation for them. A candidate has to

secure a minimum of 50% to be declared successful in all the three evaluations. If the candidate fails, he/she has to re-register for Comprehensive Online Examination /seminars. Assessment of these three shall be done by a board consisting of Head of the Department, concerned thesis supervisors, and senior faculty members of the department.

iv. A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

v. In case the candidate does not secure the minimum aggregate marks as specified in 5 (iv) he/she has to reappear for the semester examination either the supplementary or regular in that subject or repeat the course as and when next offered or do any other specified subject as may be required. *However the candidate is permitted to appear for two courses per semester only*.

6. ATTENDANCE:

A student shall be eligible to appear for end semester examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.

i. Condonation of shortage of attendance up to 10% in any subject i.e. from 65% and above and less than 75% may be given by the College Academic Committee.

ii. **Shortage of Attendance below 65% in aggregate shall in NO case be condoned**.

iii. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

iv. Students whose shortage of attendance is not condoned in any semester are not eligible to take their external Examination of that class and their registration shall stand cancelled.

v. A student will not be promoted to the next semester unless he/she satisfies the attendance requirements of the present semester, as applicable. They may seek readmission for that semester as and when offered next.

vi. A stipulated fee shall be payable towards condonation of shortage of attendance to the institution.

7. Grading System is to be introduced. After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

vii. Table – Conversion into Grades and Grade Points assigned

Academic performance	Letter Grade	Grade points Assigned
≥ 95%	S	10
≥90% - < 95%	A++	9.5
≥ 85% - <90%	A+	9
≥80% - <85%	A	8.5
≥75% - <80%	B++	8
≥70% - <75%	B+	7.5
≥65% - <70%	B	7
≥60% - <65%	C++	6.5
≥55% - <60%	C+	6
≥50% - <55%	C	5.5
≥45% -< 50%	D	5
≥40%- < 45%	E	4.5
Below 40%	F(Fail)	0
Absent	Ab (Absent)	0

i. The following procedure shall be adopted to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA);

ii. The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$SGPA = \Sigma (C_i \times G_i) / \Sigma C_i$$

Where, Ci is the number of credits of the i^{th} subject and Gi is the grade point scored by the student in the i^{th} course.

ii. The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$CGPA = \Sigma (C_i \times S_i) / \Sigma C_i$$

Where 'Si' is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester.

iii. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

iv. While computing the GPA/CGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.
Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.

8. AWARD OF DEGREE AND CLASS:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he/she shall be placed in one of the following four classes:

Class Awarded	**CGPA Secured**
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 4.0 < 5.5

(The marks in internal evaluation and external Examination shall be shown separately in the marks memorandum)
Further, CGPA to a maximum of extent of 0.05 shall be added which is just sufficient to effect change of class from pass class to Second class, Second class to First class, First class to First class with distinction for all the courses being offered, without adding any marks to the original marks secured by the students
A candidate shall be eligible for the award of respective degree if he/she satisfies the minimum academic requirements in every subject and secures at least satisfactory report on his/her thesis / dissertation and viva-voce.

9. WITHHOLDING OF RESULTS

The result of a candidate shall be withheld if:

i. He/she has not cleared any dues to the Institution / Hostel.
ii. A case of disciplinary action against him/her is pending disposal.

10. TRANSITORY REGULATIONS:

Candidates who have discontinued or have been detained for want of attendance or who have failed after having undergone the course are eligible for re-admission to the same or equivalent subjects as and when subjects are offered, subject to the conditions mentioned in 5-(iv) and 2-(ii).

11. GENERAL:

The academic regulations should be read as a whole for purpose of any interpretation.

i. The college reserves the right of altering the regulations as and when necessary. The regulations altered may be applicable to all the candidates on rolls.
ii. Wherever the word he, him or his occur, it will also includes she, her, hers.
iii. There shall be no place for transfer of candidate within the constituent colleges of Jawaharlal Nehru Technological University during the entire course of the programme.

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JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

Course structure for M.Tech COMPUTER SCIENCE ENGINEERING (Regular) with effective from 2017-18

I M.Tech I Semester

S.NO	COURSE CODE	SUBJECT NAME	THEORY	LAB	CREDITS
1	17D58101	ADVANCED DATA STRUCTURES AND ALGORITHMS	4	-	4
2	17D58102	ADVANCED OPERATING SYSTEM	4	-	4
3	17D58103	ADVANCED DATABASE MANAGEMENT SYSTEM	4	-	4
4	17D58104	OPTIMIZATION TECHNIQUES	4	-	4
	17D58105	NATURALLANGUAGE PROCESSING			
	17D58106	SERVICE ORIENTED ARCHITECTURE			
5	17D58107	ADVANCES IN SOFTWARE ENGINEERING	4		4
	17D58108	BUSINESS INTELLIGENCE			
	17D58109	PARALLEL AND DISTRIBUTED COMPUTING			
	17D58110	DATA STRUCTURES AND OPERATING SYSTEMS LAB		3	2
	17D58111	ADVANCED DATABASE MANAGEMENT LAB		3	2
		CONTACT PERIODS /WEEK	20	6	
		TOTAL CREDITS	24		

I M.Tech II Semester

S.NO	COURSE CODE	SUBJECT NAME	THEORY	LAB	CREDITS
1	17D58201	NETWORK PROGRAMMING	4	-	4
2	17D58202	ADVANCED INTERNET OF THINGS	4	-	4
3	17D58203	DATA ANALYTICS	4	-	4
4	17D58204	SOFTWARE ARCHITECTURE AND DESIGN PATTERNS			4
	17D58205	INFORMATION RETRIEVAL SYSTEMS			
	17D58206	DIGITAL MARKETING AND SOCIAL MEDIA MANAGEMENT			
5	17D58207	MOBILE CLOUDS			4
	17D58208	CYBER SECURITY AND DIGITAL FORENSICS			
	17D58209	SEMANTIC WEB MINING			
6	17D58210	ADVANCED INTERNET OF THINGS LAB		3	2
7	17D58211	NETWORK PROGRAMMING LAB		3	2
8	17D58212	COMPREHENSIVE ONLINE EXAMINATION			2
		CONTACT PERIODS /WEEK	20	6	
		TOTAL CREDITS	26		

II M.Tech I Semester

S.NO	Course Code	Subject	Maximum Marks		Total	Min. Marks/ Grades to Pass	Credits
			Internal	External			
1	17D58301	Seminar-I	50	-	50	25	0

II M.Tech II Semester

S.NO	Course Code	Subject	Maximum Marks		Total	Min. Marks/ Grades to Pass	Credits
			Internal	External			
1	17D58401	Seminar-II	50	-	50	25	0
2	17D58402	**Project Work** Grades : A, B, C, D A - Excellent B - Good C – Satisfactory D - Unsatisfactory	-	-	-	-	18

I M.TECH-I SEMESTER

ADVANCED DATA STRUCTURES AND ALGORITHMS (17D58101)

L	T	P	C
4	0	0	4

Course Objectives:

1. To impart the basic concepts of data structures and algorithms
2. To understand concepts about searching and sorting techniques
3. To Understand basic concepts about stacks,queues,lists,trees and graphs
4. To understanding about writing algorithms and step by step approach in solving problems with thehelp of fundamental data structures

UNIT I

Stack and Queue ADTs, array and linked list representations, infix to postfix conversion using stack, implementation of recursion, Circular queue-insertion and deletion, Dequeue ADT, array and linked list representations, Priority queue ADT, implementation using Heaps, Insertion into a Max Heap, Deletion from a Max Heap, java.util package-ArrayList, Linked List, Vector classes, Stacks and Queues in java.util, Iterators in java.util.

UNIT II

Searching–Linear and binary search methods, Hashing-Hash functions, Collision Resolution methods-Open Addressing, Chaining, Hashing in java.util-HashMap, HashSet, Hashtable.

Sorting –Bubble sort, Insertion sort, Quick sort, Merge sort, Heap sort, Radix sort, comparison of sorting methods.

UNIT III

Trees- Binary Tree ADT, Binary search trees ADT AVL trees-Definition and examples only, Red Black trees – Definition and examples, B Trees definition, insertion and searching operations, Trees in java.util- TreeSet, Tree Map Classes, Tries(examples only),Comparison of Search trees. Text compression-Huffman coding and decoding, Pattern matching-KMP algorithm.

UNIT IV

Dynamic programming: Matrix chain multiplication, Optimal BST, Greedy algorithms – Shortest path algorithm, MST, Amortized analysis, Data structures for disjoint sets,

Divide-and-Conquer- Karatsuba integer multiplication, Large integer multiplications using FFT.

UNIT V

NP-Completeness: Poly-time, Poly-time verification, reducibility, NP-Complete problems, Approximation algorithms, Randomized algorithms: Las Vegas and Monte Carlo, Game-Theoretic Techniques: Game Tree Evaluation, The Minimax Principle, Randomness and Non-uniformity, Moments and Deviations: Occupancy Problems, The Markov and Chebyshev, Inequalities, Randomized Selection, Two-Point Sampling, The Stable Marriage Problem

Course Outcomes:

1. Ability to analyze algorithms and algorithm correctness.
2. Ability to summarize searching and sorting techniques
3. Ability to describe stack,queue and linked list operation.
4. Ability to have knowledge of treeand graphs concepts.

TEXTBOOKS:

1. Data Structures Algorithms and Applications in Java, S.Sahni, Universities Press.
2. Data structures and Algorithms in Java, Adam Drozdek, 3rd edition, Cengage Learning.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, 2nd Edition, The MIT Press, 2001.

REFERENCES:

1. C.H. Papadimitriou. Complexity Theory.Addison-Wesley, Reading, MA, 1994.
2. Rajeev Motwani and PrabhakarRaghavan, Randomized Algorithms, Cambridge University Press, 1995. 3. Garey Michael R, Johnson davis S, Computers and Intractability: A Guide the theory of NP-Incompleteness, W.H. Freeman & Co.1979

I M.TECH -I SEMESTER

ADVANCED OPERATING SYSTEM (17D58102)

L	T	P	C
4	0	0	4

Course Objectives :

1. To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols
2. To gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols
3. To know the components and management aspects of Real time, Mobile operating Systems.

UNIT-I : Introduction to UNIX : History, Need of change, Standards The process and the kernel : Mode, space and context, Process abstraction, executing in kernel mode, synchronization by blocking interrupts, process scheduling, signals, process creation, termination, awaiting process termination, zombie processes.

UNIT-II : Introduction to Threads : Fundamental abstractions, Lightweight process design, issues to consider, User level thread libraries, scheduler activations, Multi-threading on Solaris, threads library, Thread library implementation.

UNIT- III : Signals and Session Management : Signal generation and handling, Unreliable signals, Reliable signals, Signals in SVR4, Signals implementation, Exceptions, Process Groups and Terminal management, SVR4 Sessions architecture.

UNIT- IV : Process Scheduling : Clock interrupt handling, Scheduler Goals, Traditional UNIX scheduling case studies Synchronization and Multiprocessing : Introduction, Synchronization in Traditional UNIX Kernels, Multiprocessor Systems, Multiprocessor synchronization issues, Semaphores, spin locks, condition variables Read-write locks for multiprocessor systems, Reference counts and other considerations.

UNIT- V : File system interface and framework : The user interface to files, File systems, Special files, File system framework, The Vnode/Vfs architecture, Implementation Overview, File System dependent objects, Mounting a file system, Operations on files.

File System Implementations: V file system (s5fs) implementation, Berkeley FFS, FFS functionality enhancements and analysis, Temporary file systems, Buffer cache and other special-purpose file systems.

Distributed File Systems: Network File System (NFS), Remote File Sharing (RFS).

Course Outcomes :

1. Be familiar with various types of operating systems including Unix.
2. Be familiar with various types of operating systems including Unix.
3. Master various process management concepts including scheduling, synchronization, deadlocks.
4. Understand and analyse theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.
5. Understand the design approaches of advanced operating systems.

TEXTBOOKS:

1. UreshVahalia, UNIX Internals, Pearson Education, 2005.

2. Richard Stevens, Stephen Rago, Advanced Programming in the UNIX Environment, Pearson Education, 2/e.

REFERENCES:

1. William Stallings, “Operating Systems – Operating System: Internals and Design Principles”, 4 th ed. Prentice Hall, 2005.

2. Nancy Lynch, “Distributed Algorithms”, Morgan Kaufmann.

3. Jie Wu, “Distributed Systems”, CRC Press.

4. HagitAttiya, Jennifer Welch, “Distributed Computing: Fundamentals, Simulations and Advanced Topics”, McGraw-Hill.

5. SapeMullender, “Distributed Systems”, Addison-Wesley.

I M.TECH -I SEMESTER

ADVANCED DATABASE MANAGEMENT SYSTEMS (17D58103)

L	T	P	C
4	0	0	4

Course Objectives:

a. Articulate how data is stored in both primary and secondary storage.
b. Explain database management system architecture.
c. Identify, describe, and categorize database objects.
d. Design and implement advanced queries using Structured Query Language.
e. Design, construct and maintain a database and various database objects using procedural language constructs, forms and reports to solve problems .
f. Design and implement a complete problem solution using current database technology.
g. Administer a database by recommending and implementing procedures including database tuning, backup and recovery.
h. Propose, implement and maintain database security mechanisms.
i. Explore non-relational database systems and structures.

UNIT I

Relational Model : Data Model – Types of Data Models: – Entity Relationship Model – Relational Data Model – Mapping Entity Relationship Model to Relational Model – Structured Query Language – Database Normalization – Transaction Management.

UNIT II

Parallel and Distributed Databases : Centralized and Client-Server Architectures – Parallel Systems – Distributed Systems – Parallel Databases – I/O Parallelism – Inter- and Intra-Query Parallelism – Inter- and Intra-operation Parallelism – Distributed Database Concepts: – Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing.

UNIT III

XML Databases:XML Data Model – DTD – XML Schema – XML Querying – Web Databases – Open Database Connectivity.

UNIT IV

Multimedia Databases : Multidimensional Data Structures – Image Databases – Text / Document Databases – Video Databases – Audio Databases – Multimedia Database Design.

UNIT V

Current Issues: Active Databases – Deductive Databases – Data Warehousing – Data Mining – Database Tuning – Database Security

Course Outcomes:

1. Understand Distributed Database Process, Architecture, and Design Principles.
2. Apply Distributed Query Optimization Techniques and Algorithms.
3. Analyze and apply Concurrency Control and Reliability Techniques.
4. Characterize Parallel Databases and Distributed Object Databases

TEXT BOOKS:

1. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Addison-Wesley, 2011.
2. Thomas Cannolly and Carolyn Begg, “Database Systems, A Practical Approach to Design, Implementation and Management”, Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Fifth Edition, McGraw Hill, 2006.

REFERENCES:

1. C.J.Date, A.Kannan and S.Swamynathan,”An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
2. V.S.Subramanian, “Principles of Multimedia Database Systems”, Harcourt India Pvt. Ltd., 2001.

I M.TECH -I SEMESTER

OPTIMIZATION TECHNIQUES(17D58104)

L	T	P	C
4	0	0	4

Course Objectives :

This course is designed for first year M.Tech students. The course is intended to make the students understand the basic concepts and advanced concepts of optimization techniques.

The main objective of the course is to:

1. Develop systematic approach to handle problems to design of electrical circuit etc; with a goal ofmaximizing the profit and minimizing cost.
2. Understand the various optimization techniques such as classified optimization,linearprogramming.One dimensional minimization methods,unconstrained optimization techniques, constrained optimization techniques and dynamic programming.
3. Understand the necessary sufficient conditions for finding the solution of the problems in classicaloptimization.
4. Comprehend the numerical methods for finding approximate solution of complicated problems.
5. Apply methods like north west corner rule, least count method etc. to solve the transportation problem.

UNIT-I

Introduction to Operation Research: Operation Research approach, scientific methods, introduction to models and modeling techniques, general methods for Operation Research models, methodology and advantages of Operation Research, history of Operation Research.

UNIT-II

Linear Programming (LP): Introduction to LP and formulation of Linear Programming problems, Graphical solution method, alternative or multiple optimal solutions, Unbounded solutions, Infeasible solutions, Maximization – Simplex Algorithm, Minimization – Simplex Algorithm using Big-M method, Two phase method, Duality in linear programming, Integer linear programming.

UNIT-III

Transportation & Assignment Problems: Introduction to Transportation problems, various methods of Transportation problem, Variations in Transportation problem, introduction to Assignment problems, variations in Assignment problems.

UNIT-IV

Network Analysis: Network definition and Network diagram, probability in PERT analysis, project time cost trade off, introduction to resource smoothing and allocation.

Sequencing: Introduction, processing N jobs through two machines, processing N jobs through three machines, processing N jobs through m machines.

UNIT-V

Inventory Model: Introduction to inventory control, deterministic inventory model, EOQ model with quantity discount.Queuing Models: Concepts relating to queuing systems, basic elements of queuing model, role of Poison & exponential distribution, concepts of birth and death process.

Course Outcomes :

1. Design of mechanical systems and interdisciplinary engineering applications and business solutionsusing suitable optimization technique.
2. Apply numerical or iterative techniques in power systems for optimal power flow solutions.
3. Optimize the parameters in control systems for desired steady state or transient response.
4. Optimize the cost function in deciding economic factors of power systems.
5. Design of electrical systems optimally using suitable techniques like univariate method,steepest descent method etc.

TEXTBOOKS :

1.J K Sharma, Operations Research Theory and Applications, MacMillan India Ltd.
2.N D Vohra, Quantitative Techniques in management, Tata McGraw Hill.

REFERENCES:

1.Handy A Taha, Operations Research – An Introduction, Prentice Hall of India, New Delhi.
2.Wagner H M, Principles of Operations Research: With Applications to Management Decisions, Prentice-Hall of India, New Delhi.
3.Hillier F S and Lieberman G J, Operations Research, Holden Day Inc., San Francisco.
4.Payne T A, Quantitative Techniques for Management: A Practical Approach, Reston Publishing Co. Inc., Virginia.
5.Wilkes F M, Baum P and Smith G D, Management Science: An introduction, John Wiley and Sons, Santa Barbara.

I M.TECH -I SEMESTER

NATURAL LANGUAGE PROCESSING(17D58105)

L	T	P	C
4	0	0	4

Course Objectives:

1. This course introduces the fundamental concepts and techniques of natural language processing (NLP)
2. Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.
3. The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.

UNIT I

Introduction and Overview What is Natural Language Processing, hands-on demonstrations.Ambiguity and uncertainty in language. The Turing test.Regular Expressions Chomsky hierarchy, regular languages, and their limitations.Finite-state automata.Practical regularexpressions for finding and counting language phenomena.A little morphology.Exploring a largecorpus with regex tools.

UNIT II

Context Free Grammars Constituency, CFG definition, use and limitations. Chomsky Normal Form. Top-down parsing, bottom-up parsing, and the problems with each. The desirability ofcombining evidence from both directions Non-probabilistic Parsing Efficient CFG parsing withCYK, another dynamic programming algorithms. Earley parser. Designing a little grammar, andparsing with it on some test data.Probability Introduction to probability theory Joint andconditonal probability, marginals, independence, Bayes rule, combining evidence. Examples ofapplications in natural language. Information Theory The "Shannon game"--motivated bylanguage! Entropy, cross-entropy, information gain. Its application to some language phenomena.

UNIT III

Language modeling and Naive BayesProbabilistic language modeling and its applications.Markovmodels.N-grams. Estimating theprobability of a word, and smoothing. Generative models of language. Part of Speech Taggingand Hidden Markov Models , Viterbi Algorithm for Finding Most Likely HMM Path , Dynamicprogramming with Hidden Markov Models, and its use for part-of-speech tagging, Chinese wordsegmentation, prosody, information extraction.

UNIT IV

ProbabilisticContext Free GrammarsWeighted context free grammars. Weighted CYK. Pruning and beam search.Parsing with PCFGsA treebank and what it takes to create one. The probabilistic version of CYK. Also: How dohumans parse? Experiments with eye-tracking. Modern parsers.Maximum Entropy ClassifiersThe maximum entropy principle, and its relation to maximum likelihood. Maximum entropyclassifiers and their application to document classification, sentence segmentation, and otherlanguage tasks.

UNIT V

Maximum Entropy Markov Models & Conditional Random FieldsPart-of-speech tagging, noun-phrase segmentation and information extraction models thatcombine maximum entropy and finite-state machines. State-of-the-art models for NLP.Lexical Semantics Mathematics of Multinomial and Dirichlet distributions, Dirichlet as asmoothing for multinomials.Information Extraction & Reference Resolution- Various methods, including HMMs. Modelsof anaphora resolution.Machine learning methods for coreference.

Course Outcomes:

1. The students will get acquainted with natural language processing and learn how to apply basic algorithms in this field.
2. They will understand the algorithmic description of the main language levels: morphology, syntax, semantics, and pragmatics, as well as the resources of natural language data - corpora.

They will also grasp basics of knowledge representation, inference, and relations to the artificial intelligence.

TEXT BOOKS:

1. "Speech and Language Processing": Jurafsky and Martin, Prentice Hall.
2. "Statistical Natural Language Processing"- Manning and Schutze, MIT Press.
3. “Natural Language Understanding”. James Allen. The Benajmins/Cummings PublishingCompany

REFERENCES BOOKS:

1. Cover, T. M. and J. A. Thomas: Elements of Information Theory. Wiley.
2. Charniak, E.: Statistical Language Learning. The MIT Press.
3. Jelinek, F.: Statistical Methods for Speech Recognition. The MIT Press.
4. Lutz and Ascher - "Learning Python", O'Reilly.

I M.TECH -I SEMESTER

SERVICE ORIENTED ARCHITECTURE(17D58106)

L	T	P	C
4	0	0	4

Course Objectives:

1. To understand various architecture for application development.
2. To understand the importance of SOA in Application Integration.
3. To learn web service and SOA related tools.
4. To Learn implementation details of SOA.
5. To understand varies case studies.

UNIT-I

Introducing SOA: Fundamental SOA- Common Misperceptions about SOA- Common tangible benefits of SOA-Common pitfalls of adopting SOA. The Evolution of SOA:-from XML to Web services to SOA, The continuing evolution of SOA, The roots of SOA. Web Services and Primitive SOA: The Web services framework- Services, Service descriptions, messaging with SOAP.

UNIT-II

Web Services and Contemporary SOA: Message exchange patterns- Service activitycoordination-Atomic transactions-Business activities-Orchestration-Choreography- Web Services and Contemporary SOA: Addressing- Reliable messaging- Correlation- PoliciesMetadata exchange- Security- Notification and eventing. SOA and Service-Orientation: Principles of Service-Orientation-Service-orientation. - Anatomy of a service-oriented architecture-Common principle of service-orientation-Service Layers –Service orientation.

UNIT-III

Building SOA: SOA Delivery Strategies- SOA delivery lifecycle phases. Service-Oriented Analysis: Introduction to service-oriented analysis- Benefits of a business-centric SOADeriving business services- Service-Oriented Analysis: Service modeling, Service modeling guidelines- Classifying service model logic- Contrasting service modeling approaches.

UNIT-IV

Service-Oriented Design Introduction to service-oriented design- WSDL-related XML Schema language basics-WSDL language basics- SOAP language basics- Service interface, design tools. SOA Composition Guidelines: Steps to composing SO Considerations for choosing service layers and SOA standards, positioning of cores and SOA extensions.

UNIT-V

SOA Service Design: -Overview-Service design of business service, application service, task centric service and guidelines. SOA Business Process Design: WS-BPEL language basicsWS Coordination.

Course Outcomes:

The student shall be able to

1. Compare different IT architecture.
2. Analyze and design of SOA based applications.
3. Implement web service and realize of SOA.
4. Implement REST full services.
5. Design and implement of SOA based Application Integration using BPEL.

TEXT BOOK:

1. Thomas Erl ," Service-Oriented Architecture: Concepts, Technology & Design", Pearson Education Pte Ltd 2008.

REFERENCES:

1. Thomas Erl,"SOA Principles Of Service Design"Pearson Exclusives 2007.
2. Tomas Erl and Grady Booch,"SOA Design Patterns"Printice Hall 2008.111
3. Michael Rosen, Boris Lublinsky, Kevin T. Smith, Marc J. Balcer, "Applied SOA: ServiceOriented Architecture and Design Strategies", Wiley, 2010.
4. Douglas K. Barry, "Web Services, Service-Oriented Architectures, and Cloud Computing", Elsevier, 2003.
5. James Bean, "SOA and Web Services Interface Design: Principles, Techniques, and Standards", Elsevier, 2010

I M.TECH -I SEMESTER

ADVANCES IN SOFTWARE ENGINEERING(17D58107)

L	T	P	C
4	0	0	4

Course Objectives:

1. Enables students skills in programming to become information technology professionals.
2. Ability to undertake complex development projects in a Modern Distributed Computing environment.

UNIT I : Introduction

System concepts- software engineering concepts- software life cycle- Development activities- Managing software development-Unifies modeling language-project organization-communication.

UNIT-II : Analysis

Requirements Elicitaion-Usecases-Unifiled modeling language, tools-Analysis object model(domain model) – Analysis Dynamic models-Non- functional requirements- analysis patterns.

UNIT-III : System Design

Overview of system design –Decomposing the system –system design concepts-system design activities-addressing design goals –managing system design.

UNIT-IV : Implementation and Managing Change

Programming Languages and coding- Human computer interaction – Reusing pattern solutions-specifying interfaces – Mapping models to code –Testing rationale management configuration management – Project Management- Real time interface design(eg: Mobile Design).

UNIT-V : Aspect Oriented software Development

AO Design principles- Separations of concerns, subject oriented decomposition, traits, aspect oriented decomposition, theme approach, designing base and crosscutting themes, aspect-Oriented programming using aspect – J.

Course Outcomes:

1. Understand and adhere to professional ethical standards in the system development and modification process, especially by accepting responsibility for the consequences of design decisions and design implementations
2. The ability to build and configure major operating system components
3. The ability to analyze and implement solutions to complex problems involving computers and networks
4. The ability to work effectively in teams

A solid understanding to the methods of modern software engineering

TEXT BOOKS:

1. Bernd Bruegge, Alan H Dutoit, Object Oriented software Engineering, 2nd Ed, Pearson Education,2004.
2. Craig Larman, Applying UML and Patterens , 3rded, Pearson Education, 2005.

REFERENCES:

1. Stephan Schach, Softwarr Engineering 7thed , McGraw-Hill,2007.
2. AspectJ in Action, RamnivasLaddad, Manning Publications,2003.
3. Aspect oriented software development, Robert E Filman, TzillaElard, Siobhan Clarke, and Mehmet Aksit, October 2006

Aspect oriented Software Development with use-cases(The Addission-Wesley Object Technology Series), Ivar Jacobson and Pan-Wei ng , 2004.

I M.TECH -I SEMESTER

BUSINESS INTELLIGENCE(17D58108)

L	T	P	C
4	0	0	4

Course Objectives:

1. The objectives of this course are to provide graduate students of M.Sc.
2. Information Systems with comprehensive and in-depth knowledge of Business Intelligence (BI) principles and techniques by introducing the relationship between managerial and technological perspectives.
3. This course is also designed to expose students to the frontiers of BI-intensive BIG data computing and information systems, while providing a sufficiently strong foundation to encourage further research.

UNIT -I

Business Intelligence Introduction – Definition, Leveraging Data and Knowledge for BI,BI Components, BI Dimensions, Information Hierarchy, Business Intelligence andBusiness Analytics.BI Life Cycle.Data for BI - Data Issues and Data Quality for BI.

UNIT -II

BI Implementation - Key Drivers, Key Performance Indicators and operational metrics,BI Architecture/Framework, Best Practices, Business Decision Making.Business Analytics – Objective Curve, Web Analytics and Web Intelligence, CustomerRelationship Management.

UNIT -III

Business/Corporate Performance Management - Dash Boards and Scorecards,Business Activity Monitoring, Six Sigma.Advanced BI – Big Data and BI, Social Networks, Mobile BI, emerging trends.

Working with BI Tools – Pentaho.Overview of managerial, strategic and technical issues associated with Business Intelligence and Data Warehouse design, implementation, andutilization. Critical issues in planning, physical design process, deployment andongoing maintenance.

UNIT -IV

Data Warehousing (DW):Data Warehouse (DW) Introduction & Overview; Data MartsDW architecture – DW components, Implementation options; Meta Data, Informationdelivery.ETL - Data Extraction, Data Transformation – Conditioning, Scrubbing, Merging, etc.,Data Loading, Data Staging, Data Quality.

UNIT -V

Dimensional Modeling - Facts, dimensions, measures, examples; Schema Design –Star and Snowflake, Fact constellation, Slow changing Dimensions.OLAP - OLAP Vs OLTP, Multi-Dimensional Databases (MDD); OLAP – ROLAP,MOLAP, HOLAP;Data Warehouse Project Management - Critical issues in planning, physical designprocess, deployment and ongoing maintenance.

Course Outcomes:

Identify the major frameworks of computerized decision support: decision support systems (DSS), data analytics and business intelligence (BI).

1. Explain the foundations, definitions, and capabilities of DSS, data analytics and BI.
2. List the definitions, concepts, and architectures of data warehousing.
3. Demonstrate the impact of business reporting, information visualization, and dashboards.
4. Explain data mining, neural networks, support vector machines, text analytics, text mining, sentiment analysis, web mining, web analytics, social analytics, social network analysis.
5. Outline the definitions, concepts, and enabling technologies of big data analytics.

TEXT BOOKS:

1. Efraim Turban, Ramesh Sharda, Jay Aronson, David King, Decision Supportand Business Intelligence Systems, 9th Edition, Pearson Education, 2009.

2. David Loshin, Business Intelligence - The Savy Manager's Guide GettingOnboard with Emerging IT, Morgan Kaufmann Publishers, 2009.

3. PaulrajPunniah: Data Warehousing Fundamentals: A comprehensive guidefor IT professionals, John Wiley publications, 2001.

I M.TECH -I SEMESTER

PARALLEL AND DISTRIBUTED COMPUTING(17D58109)

L	T	P	C
4	0	0	4

Course Objectives:

1. To expose students to both the abstraction and details of file systems.
2. To introduce concepts related to distributed computing systems.
3. To focus on performance and flexibility issues related to systems design decisions.
4. To prepare students for life-long learning.
5. To understand why and not just the memorize the details.
6. To expose students to current literature in distributed systems.
7. To prepare students for an industrial programming environment.

UNIT-I

Introduction to distributed programming: Anatomy of a Distributed Application, Requirements for Developing Distributed Applications, What Does Java Provide?

Introduction to sockets Programming: Sockets and stream, URLs, URL Connections, and content Handlers, The Class Loader.

UNIT-II

Distributing Objects: Why Distribute Objects, What's so tough about Distributing Objects?, Features of Distributed object schemes for JAVA, CORBA , Java RMI, RMI vs, CORBA Threds: Thred and Runnable, making a thread, Managing Threads at run time, Networked Threads

UNIT-III

Security: Security Issues and concerns, The java security package, Identities and access control, keys: public, private and secret, Digital signatures, Data inscription, choosing a cryptography algorithm. Message passing systems: Messages defined, why do we need messages? Message processing fixed protocols, adaptable protocols , Massage passing with java Events, Using remote objects data base:An over view of JDBC, remote Database applications, multi database applications.

UNIT-IV

RMI: The basic structure of RMI, The architecture diagram revisited, implementing the basic objects, the rest of the server, the client application the RMI registry: why use a naming service the RMI registry, the RMI registry is an RMI server examining the registry, Limitations of the RMI registry

UNIT-V

Security issues Naming Services: Basic design, Terminology and requirements, Requirements for our naming service, Federation and threading, the context interface, the value objects, contextlmpl, switching between naming services, the JAVA naming and directory interface(JNDI) The RMI runtime: Reviewing the mechanics of a remote method call, Distributed garbage collection, RMI's logging facilities, other JVM parameters.

Course Outcomes:

1. Study software components of distributed computing systems. Know about the communication and interconnection architecture of multiple computer systems.
2. Recognize the inherent difficulties that arise due to distributed-ness of computing esources. Understanding of networks & protocols, mobile & wireless computing and their applications to real world problems.
3. At the end students will be familiar with the design, implementation and security issues of distributed system.

TEXT BOOKS:

1. JAVA Distributed computing, Jim Farely, O'Reilly
2. JAVA RMI Designing and Building, The Basics of RMI applications, William Grosso, O'Reilly

REFERENCES:

1. JAVA SOA cookbook SOA implementation Recipes, Tips, techniques, Eben, Hewitt, O'reilly,2009
2. Service Oriented architecture with JAVA, MalharBarai, Vincenzo Caselli, Bindildas A. Christudas, Packt Publishing,2008.
3. Distributed Programming with JAVA QUSAY H.Mahmoud Manning Publisher 2000.
4. JAVA in Distributed systems, concurrency, Distribution and persistence, Marko Boger,2001.

I M.TECH -I SEMESTER

DATA STRUCTURES AND OPERATING SYSTEMS LAB (17D58110)

L	T	P	C
0	0	3	2

PART-A(Data Structures)

1. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods:

a) Linear search b) Binary search

2. Write Java programs to implement the following using arrays and linked lists

a) List ADT

3. Write Java programs to implement the following using an array.

a) Stack ADT b) Queue ADT

4. Write a Java program that reads an infix expression and converts the expression to postfix form. (Use stacks ADT).

7. Write Java programs to implement the following using a singly linked list.

a) Stack ADT b) Queue ADT

8. Write Java programs to implement the dequeue(double ended queue) ADT using

a) Array b) Singly linked list c) Doubly linked list.

9. Write a Java program to implement priority queue ADT.

10. Write a Java program to perform the following operations:

a) Construct a binary search tree of elements.

b) Search for a key element in the above binary search tree.

c) Delete an element from the above binary search tree.

11. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.

12. Write a Java program to implement Dijkstra's algorithm for Single source shortest path problem.

14. Write Java programs for the implementation of bfs and dfs for a given graph.

15. Write Java programs for implementing the following sorting methods:

a) Bubble sort b) Insertion sort c) Quick sort f) Radix sort d) Merge sort e) Heap sort f) Radix sort g) Binary tree sort.

PART-B(Operating Systems)

1. Simulate the following CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority.
2. Simulate all file allocation strategies a) Sequential b) Indexed c) Linked.
3. Simulate MVT and MFT.
4. Simulate all File Organization Techniques a) Single level directory b) Two level c) Hierarchical d) DAG.
5. Simulate Bankers Algorithm for Dead Lock Avoidance.
6. Simulate Bankers Algorithm for Dead Lock Prevention.
7. Simulate all page replacement algorithms a) FIFO b) LRU c) LFU Etc. …
8. Simulate Paging Technique of memory management.

I M.TECH -I SEMESTER

ADVANCED DATABASE MANAGEMENT LAB(17D58111)

L T P C
00 32

1. IMPLEMENT DDL AND DML COMMANDS IN RDBMS
2. Design an Enhanced Entity Relationship (EER) Model for university database by using Matisse Enterprise manager.
   Write OQL for the following
   i. Insert details in each object.
   ii. Display the Employee details.
   iii. Display Student Details.
   iv. Modify person details.
   v. Delete person details

3. Create triggers and assertions for Bank database handling deposits and loan and admission database handling seat allocation and vacancy position.

4. DEDUCTIVE DATABASE: construct a knowledge database for kinship domain (family relations) with facts. Extract the following relations using rules: Parent, Sibling, Brother, Sister, Child, Daughter, Son, Spouse, Wife, husband, Grandparent, Grandchild, Cousin, Aunt and Uncle

5. Installation and Processing of WEKA Tool

6. Design XML Schema for the given company database Department (deptName, deptNo, deptManagerSSN, deptManagerStartDate, deptLocation) Employee (empName, empSSN, empSex, empSalary, empBirthDate, empDeptNo, empSupervisorSSN, empAddress, empWorksOn) Project (projName, projNo, projLocation, projDeptNo, projWorker)

   1. Implement the following queries using XQuery and XPath 1)Retrieve the department name, manager name, and manager salary for every department' 2)Retrieve the employee name, supervisor name and employee salary for each employee who works in the Research Department. 3)Retrieve the project name, controlling department name, number of employees and total hours worked per week on the project for each project. 4)Retrieve the project name, controlling department name, number of employees and total hours worked per week on the project for each project with more than one employee working on it
   2. Implement a storage structure for storing XML database and test with the above schema.

I M.TECH -II SEMESTER

NETWORKING PROGRAMMING(17D58201)

L	T	P	C
4	0	0	4

Course Objectives:

1. To state the major components and describe the architecture of the UNIX operating system.
2. To teach advanced C systems programming and debugging techniques in a Unix/Linux environment.
3. To review basic concepts covered in the core Operating Systems course prerequisite as they are realized in the Linux platform.
4. To organize and manipulate files and directories.
5. To use UNIX utilities to create simple tools for the information processing.
6. To introduce Network Programming covering TCP, and UDP connections.
7. To explain Socket programming to design client- server environment.
8. To explain inter process communication consisting of pipes, FIFOs, Semaphores and message Queues.

UNIT-I

Introduction to ISO's OSI Network Architecture, Internet Model, IP Design and Implementation, Internetworking and routing protocols, Transport layer services and variants, Peer to PeerNetworks, Application Layer protocols, Introduction to network Security and associatedtechniques, Firewall Design principles, VPNs, Worms, Viruses, Vaccine Programs, Securityof Network Layer, Security of application layer protocols, BSD sockets, Elementary andAdvanced system calls,

UNIT-II

Raw sockets: Raw Socket Creation, Raw socket output, raw socketinput, packet sniffing and routing algorithms: Router IOS- Static and Default Routing-InteriorGateway Routing Protocols: RIP V1&V2, OSPF, EIGRP- Exterior Gateway Routing Protocol:BGP

UNIT-III

Introduction to socket programming- Concurrent Processing in Client-Server Software-Byteordering and address conversion functions – Socket Interface - System calls used with sockets- Iterative server and concurrent server- Multi protocol and Multi service server- TCP/UDPClient server programs – Thread Creation and Termination – TCP Echo Server using threadsRemoteProcedure Call.

UNIT-IV

Symmetric ciphers: Classical Encryption Techniques: Substitution Techniques,TranspositionTechniques, Steganography. Block Ciphers and the Data Encryption Standard, Block CipherPrinciples, The Data Encryption Standard.

UNIT-V

Basic Concepts in Number Theory and Finite Fields: Divisibility and the Division Algorithm, The Euclidean Algorithm. Advanced Encryption Standard, Pseudorandom Number Generation and Stream Ciphers.

Course Outcomes:

1. To understand the use of client/server architecture, inter process communication and to explain the basic communication protocols.
2. To understand elementary socket system calls, advanced socket system calls and Java Socket API and to explain the basic concepts relating to TCP and UDP based sockets.
3. To understand File transfer protocol, remote login using pseudo terminal and RPC.

TEXT BOOKS :

1. Richards Stevens, Unix network programming, Vol I &Vol II 4th edition, PHI 2007.

REFERENCES:

1. Stallings , Cryptography and Network Security, Pearson Education 2007.

I M.TECH -II SEMESTER

ADVANCED INTERNET OF THINGS(17D58202)

L	T	P	C
4	0	0	4

Course Objectives:

1. To introduce the terminology, technology and its applications.
2. To introduce the concept of M2M (machine to machine) with necessary protocols.
3. To introduce the Python Scripting Language which is used in many IoT devices.
4. To introduce the Raspberry PI platform, that is widely used in IoT applications.
5. To introduce the implementation of web based services on IoT devices.

UNIT I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoTenabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER .

UNIT III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib.

UNIT IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

Course Outcomes:

1. Interpret the vision of IoT from a global context.
2. Determine the Market perspective of IoT.
3. Compare and Contrast the use of Devices, Gateways and Data Management in IoT.
4. Implement state of the art architecture in IoT.
5. Illustrate the application of IoT in Industrial Automation and identify Real World Design.

TEXT BOOKS:

1.Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547

REFERENCES:

1.Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN:

I M.TECH -II SEMESTER

DATA ANALYTICS(17D58203)

L	T	P	C
4	0	0	4

Course Objectives :

The objectives of this subject are to:

1. Introduce students the concept and challenge of big data (3 V's: volume, velocity, and variety).
2. Teach students in applying skills and tools to manage and analyze the big data.
3. The students should acquire knowledge on how to design BI solutions for different BI targets and users.

UNIT-I

Introduction to Big Data. What is Big Data. Why Big Data is Important. Meet Hadoop.Data Storage and Analysis.Comparison with other systems.Grid Computing.A brief history ofHadoop.Apachehadoop and the Hadoop EcoSystem.Linux refresher; VMWare Installation of Hadoop.

UNIT-II

The design of HDFS.HDFS concepts.Command line interface to HDFS.Hadoop File systems.Interfaces.Java Interface to Hadoop. Anatomy of a file read. Anatomy of a file writes. Replica placement and Coherency Model. Parallel copying with distcp, Keeping an HDFS cluster balanced.

UNIT-III

Introduction. Analyzing data with unix tools. Analyzing data with hadoop. Java MapReduce classes (new API). Data flow, combiner functions, Running a distributed MapReduce Job. Configuration API.Setting up the development environment.Managingconfiguration.Writing a unit test with MRUnit.Running a job in local job runner.Running on a cluster.Launching a job.The MapReduce WebUI.

UNIT-IV

Classic Mapreduce.Jobsubmission.JobInitialization.Task Assignment. Task execution .Progress and status updates. Job Completion. Shuffle and sort on Map and reducer side. Configuration tuning. Map Reduce Types. Input formats. Output formats, Sorting. Map side and Reduce side joins.

UNIT-V

The Hive Shell. Hive services. Hive clients. The meta store. Comparison with traditional databases. Hive Ql. Hbasics. Concepts.Implementation. Java and Map reduce clients. Loading data, web queries.

Course Outcomes:

1. Organizational and individual decision-making.
2. key concepts and current practices of business intelligence.
3. The individual, organizational and societal impacts of BI systems.
4. Analytical techniques used in business intelligence systems.
5. Integration of business intelligence into decision-making processes.

TEXT BOOKS:

1. Tom White, Hadoop,"The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012.

REFERENCES:

1. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch ,"Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012.

I M.TECH -II SEMESTER

SOFTWARE ARCHITECTURE AND DESIGN PATTERNS(17D58204)

L	T	P	C
4	0	0	4

Course Objectives:

The main objective is to introduce the student to architecture of softwareand design Patterns. Upon completion of this course the student will Getan idea on envisioning architecture, creating an architecture, analyzingarchitecture.

1. Understand the creational and structural patterns.
2. Be capable of applying his knowledge to create an architecture forgiven application.
3. Be able to explain the role of analyzing architectures.
4. Be able to identify different structural patterns.

UNIT I (Envisioning Architecture) :

The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.Creating an ArchitectureQuality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

UNIT II (Analyzing Architectures) :

Architecture Evaluation, Architecture design decision making, ATAM, CBAM.Moving from one system to many Software Product Lines, Building systems from off the shelf components, Software architecture in future.

UNIT III (Patterns) :

Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage.Creational and Structural patterns Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, flyweight.

UNIT IV (Behavioral patterns) :

Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

UNIT V (Case Studies) :

A-7E – A case study in utilizing architectural structures, The World Wide Web - a case study in interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development.

Course Outcomes:

At the end of the course the student will be able to

1. Understand the architecture, creating it and moving from one toany, different structural patterns.
2. Analyze the architecture and build the system from thecomponents.
3. Design creational and structural patterns.
4. Learn about behavioral patterns.
5. Do a case study in utilizing architectural structures.

TEXT BOOKS:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.
2. Design Patterns, Erich Gamma, Pearson Education, 1995.

REFERENCE BOOKS:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
3. Software Design, David Budgen, second edition, Pearson education, 2003
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
5. Design Patterns in Java, Steven John Metsker& William C. Wake, Pearson education, 2006
6. J2EE Patterns, Deepak Alur, John Crupi& Dan Malks, Pearson education, 2003.
7. Design Patterns in C#, Steven John metsker, Pearson education, 2004.
8. Pattern Oriented Software Architecture, F.Buschmann& others, John Wiley & Sons

I M.TECH -II SEMESTER

INFORMATION RETRIEVAL SYSTEMS(17D58205)

L	T	P	C
4	0	0	4

Course Objectives:

1. Become familiar with difference between Information retrieval and data Base ManagementSystems
2. Students will be able to learn different indexing techniques to apply data Base systems
3. Students will be able to understand various searching techniques to retrieve data from databasesand ware houses.

UNIT I

Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses, Information Retrieval System Capabilities - Search, Browse,Miscellaneous.

UNIT II

Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction, Data Structures: Introduction, Stemming Algorithms, Inverted file structures, Ngram data structure, PAT data structure, Signature file structure, Hypertext data structure - Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages.

UNIT III

Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters - User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext - Information Visualization: Introduction, Cognition and perception, Information visualization technologies.

UNIT IV

Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems. Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

UNIT V

Multimedia Information Retrieval – Models and Languages – Data Modeling, Query Languages, Indexing and Searching - Libraries and Bibliographical Systems – Online IR Systems, OPACs, Digital Libraries.

Course Outcomes:

1. Ability to identify Data Base Management systems and data ware houses
2. Ability to use knowledge of data structures and indexing methods in information retrieval Systems
3. Ability to choose clustering and searching techniques for different data base systems
4. Ability to Explain different types of search algorithms like Hardware text search systems andsoftware text search systems

TEXT BOOKS:

1. Information Storage and Retrieval Systems: Theory and Implementation By Kowalski,
Gerald, Mark T Maybury Kluwer Academic Press, 2000.
2. Modern Information RetrivalBy Ricardo Baeza-Yates, Pearson Education, 2007.
3. Information Retrieval: Algorithms and Heuristics By David A Grossman and Ophir
Frieder, 2nd Edition, Springer International Edition, 2004.

REFERENCES:

1. Information Retrieval Data Structures and Algorithms By William B Frakes, Ricardo
Baeza-Yates, Pearson Education, 1992.
2. Information Storage &RetievalBy Robert Korfhage – John Wiley & Sons.
3. Introduction to Information Retrieval By Christopher D. Manning and Prabhakar
Raghavan, Cambridge University Press, 2008.

I M.TECH -II SEMESTER

MOBILE CLOUDS(17D58207)

L	T	P	C
4	0	0	4

Course Objectives:

1. To introduce the characteristics, basic concepts and systems issues in mobile and pervasive computing.
2. To illustrate architecture and protocols in pervasive computing and to identify the trends and latest development of the technologies in the area.
3. To give practical experience in the area through the design and execution of a modest research project.
4. To design successful mobile and pervasive computing applications and services.
5. To evaluate critical design tradeoffs associated with different mobile technologies, architectures , interfaces and business models and how they impact the usability, security, privacy andcommercial viability of mobile and pervasive computing services and applications.

UNIT-I

Introduction: Mobile Clouds Introduction and Background, Sharing Device Resources in Mobile Clouds;

UNIT-II

Enabling Technologies For Mobile Clouds: Wireless Communication Technologies, Network Coding for Mobile Clouds, Mobile Cloud Formation and Maintenance;

UNIT-III

Social Aspects Of Mobile Clouds: Social Mobile Clouds; Green Aspects Of Mobile Clouds: Green Mobile Clouds: Making Mobile Devices More Energy Efficient;

UNIT-IV

Application Of Mobile Clouds: Mobile Clouds Applications

UNIT-V

Some Insights on the Future Developments of Mobile Clouds

Course Outcomes:

1. To discover the characteristics of pervasive computing applications including the major system components and architectures of the systems.
2. To analyze the strengths and limitations of the tools and devices for development of pervasive computing systems.
3. To explore the characteristics of different types of mobile networks on the performance of a pervasive computing system.
4. To analyze and compare the performance of different data dissemination techniques and algorithms for mobile real-time applications.
5. To develop an attitude to propose solutions with comparisons for problems related to pervasive computing system through investigation.

TEXT BOOKS:

1. Frank H. P. Fitzek, Marcos D. Katz, Mobile Clouds: Exploiting Distributed Resources in Wireless, Mobile and Social Networks, Wiley Publications, ISBN: 978-0-470-97389-9, Jan 2014.

REFERENCES:

1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, and Michael Morgano, Android for Programmers: An App-Driven Approach, Prentice Hall, November 3, 2011.

I M.TECH -II SEMESTER

CYBER SECURITY AND DIGITAL FORENSICS(17D58208)

L	T	P	C
4	0	0	4

Course Objectives:

1. To provide an understanding Computer forensics fundamentals.
2. To analyze various computer forensics technologies.
3. To provide computer forensics systems.
4. To identify methods for data recovery.
5. To apply the methods for preservation of digital evidence.

UNIT I

Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types ofCyber Crime, Social Engineering, Categories of Cyber Crime, Property Cyber Crime.

UNIT II

Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses andMalicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, SoftwarePiracy, Intellectual Property, Mail Bombs, Exploitation ,Stalking and Obscenity in Internet,Digital laws and legislation, Law Enforcement Roles and Responses.

UNIT III

Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and AdvancedTools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, LinuxSystem Forensics, Network Forensics.

UNIT IV

Introduction to Cyber Crime Investigation, Investigation Tools, eDiscovery, Digital EvidenceCollection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, EmailRecovery, Hands on Case Studies, Encryption and Decryption Methods, Search andSeizure of Computers, Recovering Deleted Evidences, Password Cracking.

UNIT V

Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of IndianEvidence ACT IPC and CrPC , Electronic Communication Privacy ACT, Legal Policies.

Course Outcomes:

1. They can help the organization to continue its commercial activities in the event of significant information security incidents.
2. Students can establish responsibility and accountability for information security in organizations.
3. To be proficient in various forensic tools and usage of tools for disk imaging and recovery processes.
4. The students will be able to design security procedures and policies.

They can be well versed in various security standards and security testing techniques.

TEXT BOOKS:

1. Bernadette H Schell, Clemens Martin, “Cybercrime”, ABC – CLIO Inc, California,2004.
2. ”Understanding Forensics in IT “, NIIT Ltd, 2005.
3. Nelson Phillips and EnfingerSteuart, “Computer Forensics and Investigations”,Cengage Learning, New Delhi, 2009.

REFERENCES:

1. Kevin Mandia, Chris Prosise, Matt Pepe, “Incident Response and Computer Forensics
“, Tata McGraw -Hill, New Delhi, 2006.
2. Robert M Slade,” Software Forensics”, Tata McGraw - Hill, New Delhi, 2005.

I M.TECH -II SEMESTER

SEMANTIC WEB MINING(17D58209)

L	T	P	C
4	0	0	4

Course Objectives:

1. This course will enable students to explain the fundamentals of Semantic Web technologies.
2. Implementation of semantic web applications and the architectures of social networking Social network performance analysis

UNIT I - Introduction

The world of the semantic web-WWW-meta data-Search engine-Search engine for traditional web-Semantic web-Search engine for semantic web-Traditional web to semantic web.

UNIT II - Semantic Web Technology

RDF-Rules of RDF-Aggregation-Distributed information-RDFS-core elements of RDFS Ontology-Taxonomy-Inferencing based on RDF schema

UNIT III - OWL

OWL-Using OWL to define classes-Set operators-Enumerations-Define properties ontology
Matching-Three faces of OWL-Validate OWL.

UNIT IV- Swoogle

Swoogle-FOAF-Semantic mark up-Issues-prototype system-Design of Semantic web search-engine-Discovery and indexation-prototype system-case study.

UNIT V - Semantic Web Services

Semantic web services-OWL-S-Upper ontology-WSDL-S,OWL-S to UDDI mapping ,Design of the search engine, implementations.

Course Outcomes:

1. Develop data mining techniques and tools for structuring and organizing unstructured sources such as text and Web data into semantic machine processable information.
2. Understand syntax, semantics and structure in HTML, text and data.
3. Understand the computational aspects of Information Extraction (IE) and linkage.

Perform discovery and information extraction tasks wherever text serves as data such as measuring public opinion and trending topics expressed in social media messages.

TEXT BOOKS :

1. LiyangYu , "*Introduction to the Semantic Web and Semantic web services*" Chapman & Hall/CRC, Taylor & Francis group, 2007.

2. Johan Hjelm, "*Creating the Semantic Web with RDF*", Wiley,2001.

3. Grigoris Antoniou and Frank van Harmelen, "*A Semantic Web Primer*", MIT Press, 2012.

NETWORK PROGRAMING LAB(17D58210)

L	T	P	C
0	0	3	2

Assignment –I :Implementation of group communication using message queues.

Assignment-II :Using PIPEs and signals, implement the following IPC programme: nodes are connected in a circular fashion. A token is passed between nodes. Token is initialized to some integer value .when the token reaches a node, node decrements the token value and passes the token to the next node. When the token value becomes zero, that particular node generates another token with the initial value, pass the token to the next node and kills itself. Node give signal to adjacent nodes .continue this until all nodes are killed.

Assignment –III :Write a program for a modified tic-tac –tye game using semaphore

Assignment –IV :Write a socket program for authentication problem

Assignment –V :Write a program for implementation of secure group communication

Assignment –VI :Write a program to implement TCP Quiz.

Assignment –VII : Write a client –server program, using sockets (TCP), where the clients send a line of characters, to the server and the server reads the line, from its network input and echoes the line back to the client(client will display the same line).

Assignment –VIII :Repeat assignment VII using UDP sockets

Assignment –IX :Write a program(Client-server) that uses an unnamed stream pipe, to connect two processes, from two different systems, where one process(Client) copies stdin to stream pipe, and the other processes(server) copies the stream pipe to stdout.

Text Books:

1. J. Thomas Shaw, “Information Security Privacy”, ABA, 2012.
2. Mathew Baieley,” Complete guide to internet privacy, Anonymity and security”, Nerel online, 2011
3. D.S. Herrmann, “A complete guide to security and privacy metrics”, Auerbachpublisher(Taylor and Fancis Group), 2007.

A. Abraham, “ Computational Social Networks:Security and privacy”, Spriger, 2012.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ,PULIVENDULA(AUTONOMUS)
PULIVENDULA -516390(A.P)India.
Engineering &Technology PG(M.Tech) Courses Proposed Course Structure

Semester-I							
S.No	Course Code	Course Name	Category	Hours per Week			Credits
				L	T	P	
1		**Core Course-I** (Advanced Data structures and algorithms)	PC	3	0	0	3
2		**Core Course-II** (Machine Learning)	PC	3	0	0	3
3		**Program Elective Course-I** 1.Distributeds operating systems 2. IOT 3. Foundations of block chain technology	PE	3	0	0	3
4		**Program Elective Course-II** 1. Data Science 2.Wireless Adhoc & sensor networks 3. Soft computing	PE	3	0	0	3
5		ADS Lab-I	PC	0	0	4	2
6		ML Lab-II	PC	0	0	4	2
7		Research Methodology and IPR	MC	2	0	0	2
8		**Audit Course-I(Pedagogy Studies)**	AC	2	0	0	0
Total							18

Semester-II							
S.No	**Course Code**	**Course Name**	**Category**	**Hours per Week**			**Credits**
				L	**T**	**P**	
1		**Core Course-III** Artificial intelligence	PC	3	0	0	3
2		**Core Course-IV** Cyber security	PC	3	0	0	3
3		**Program Elective Course-III** 1. NLP 2.Video analytics 3.Deep learning	PE	3	0	0	3
4		**Program Elective Course-IV** 1.NOSQL Databases 2.Agile development 3.Robotic process automation	PE	3	0	0	3
5		Core Lab-III(AI lab)	PC	0	0	4	2
6		Core Lab-IV(Cs Lab)	PC	0	0	4	2
7		Seminar	MC	0	0	4	2
8		Audit Course-II(Disaster Management)	AC	2	0	0	0
Total							18

Semester-III							
S.No	Course Code	Course Name	Category	Hours per Week			Credits
				L	T	P	
1		Program Elective Course-V 1. Big data Technologies 2.Web Design and Development	PE	3	0	0	3
2		Open Elective-I 1. MAD 2.ADS	OE	3	0	0	3
3		Co-Curricular Activities		0	0	4	2
4		Dissertation Phase –I	PR	0	0	20	10
Total							18

Semester-IV							
S.No	Course Code	Course Name	Category	Hours per Week			Credits
				L	T	P	
1		Dissertation Phase –II	PR	0	0	32	16
Total							16

Audit Course 1 &2:

1. Disaster Management
2. Sanskrit for Technical Knowledge
3. Value Education
4. Constitution of India
5. Pedagogy Studies
6. Stress Management by Yoga
7. Personality Development through Life Enlightenment Skills

Course Code			**L**	**T**	**P**	**C**
Semester	**I**		**3**	**0**	**0**	**3**
Course Objectives:						

Course Outcomes:		
UNIT-I		**Lecture Hrs:**
UNIT-II		**Lecture Hrs:**
UNIT-III		**Lecture Hrs:**
UNIT-IV		**Lecture Hrs:**
UNIT-V		**Lecture Hrs:**
Text Books:		
Reference Books:		
Online Learning Resources:		

ADVANCED DATA STRUCTURES & ALGORITHMS

Course Code			L	T	P	C
Semester	I		3	0	0	3

Course Objectives:

1. Understand and apply linear data structures-List, Stack and Queue. Understand the graph algorithms.
2. Learn different algorithms analysis techniques.
3. Apply data structures and algorithms in real time applications
4. Able to analyze the efficiency of algorithm.

Course Outcomes:

1. Ability to analyze algorithms and algorithm correctness.
2. Ability to summarize searching and sorting techniques
3. Ability to describe stack, queue and linked list operation.
4. Ability to have knowledge of tree and graphs concepts.

UNIT-I		Lecture Hrs: 9

LINEAR DATA STRUCTURES : Introduction - Abstract Data Types (ADT) – Stack – Queue – Circular Queue - Double Ended Queue - Applications of stack – Evaluating Arithmetic Expressions - Other Applications - Applications of Queue - Linked Lists - Singly Linked List - Circularly Linked List - Doubly Linked lists – Applications of linked list .

UNIT-II		Lecture Hrs: 12

NON-LINEAR TREE STRUCTURES : Binary Tree – expression trees – Binary tree traversals – applications of trees – Huffman Algorithm - Binary search tree - Balanced Trees - AVL Tree - B-Tree - Splay Trees – Heap, Heap operations- -Binomial Heaps - Fibonacci Heaps- Hashing.

UNIT-III		Lecture Hrs: 9

GRAPHS : Representation of graph - Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra‟s algorithm – Bellman-Ford algorithm – Floyd's Algorithm - minimum spanning tree – Prim's and Kruskal's algorithms.

UNIT-IV		Lecture Hrs: 12

ALGORITHM DESIGN AND ANALYSIS : Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Quick Sort - Binary Search - Greedy Algorithms – Knapsack Problem – Dynamic Programming – Optimal Binary Search Tree - Warshall‟s Algorithm for Finding Transitive Closure.

UNIT-V		Lecture Hrs: 12

ADVANCED ALGORITHM DESIGN AND ANALYSIS : Backtracking – N-Queen's Problem - Branch and Bound – Assignment Problem - P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem- Amortized Analysis.

Text Books:

1. Anany Levitin “Introduction to the Design and Analysis of Algorithms” Pearson Education, 2015

2. E. Horowitz, S.Sahni and Dinesh Mehta, "Fundamentals of Data structures in C++", University Press, 2007 3. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", Second Edition,
Reference Books:
1. Gilles Brassard, "Fundamentals of Algorithms", Pearson Education 2015 **2.** Harsh Bhasin, "Algorithms Design and Analysis", Oxford University Press 2015 **3.** John R.Hubbard, "Data Structures with Java", Pearson Education, 2015 **4.** M. A. Weiss, "Data Structures and Algorithm Analysis in Java", Pearson Education Asia, 2013
Online Learning Resources:

Machine Learning

Course Code			L	T	P	C
Semester	I		3	0	0	3

Course Objectives:

1. Understand and apply Supervised, Unsupervised Learning and Reinforcement learning algorithms.
2. Able to analyze the efficiency of algorithm.
3. To know how to design various applications.

Course Outcomes:

1. Design Multi-Layer neural network to solve Supervised Learning problem
2. Classify non-linear data like face recognition, disease prediction
3. Apply Genetic Algorithm for optimization problems
4. Design applications like games and agent-based controllers.

UNIT-I | **Lecture Hrs:10**

INTRODUCTION

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT-II | **Lecture Hrs:11**

NEURAL NETWORKS AND GENETIC ALGORITHMS

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evalution and Learning.

UNIT-III | **Lecture Hrs:10**

BAYESIAN AND COMPUTATIONAL LEARNING

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT-IV | **Lecture Hrs:12**

INSTANCE BASED LEARNING: K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

Unsupervised Learning : Grouping unlabeled items using k-means clustering, Association analysis with the Apriori algorithm,

UNIT-V | **Lecture Hrs:11**

ADVANCED LEARNING

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

Text Books:

1. Tom Mitchel, Machine Learning, McGraw Hill. Harrington, Peter. Machine learning in action. Manning Publications Co., 2012.

Reference Books:
1. E them ALPAYDIN, Introduction to Machine Learning, The MIT Press, 2004. Bishop, C. M., 2.Pattern recognition and machine learning, New York: springer, 2007.

Program Elective Course-I

Distributed Operating Systems

Course Code			**L**	**T**	**P**	**C**
Semester	**I**		**3**	**0**	**0**	**3**

Course Objectives:

1. Emphasis would be to provide the knowledge of communication, synchronization, resource management and security aspect in distributed operating system.
2. To gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols.

Course Outcomes:

1. Gain knowledge of distributed operating system architecture (Knowledge)
2. Illustrate principles and importance of distributed operating system (Understand)
3. Implement distributed client server applications using remote method invocation (Apply)
4. Distinguish between centralized systems and distributed systems (Analyze)
5. Create stateful and state-less applications (Create)

UNIT-I		**Lecture Hrs:09**

Introduction: Introduction of Distributed Operating System (DOS), Functions of DOS, Basic concepts, goals & challenges of distributed systems, architectures of DOS. Revisit the inter process communication.

UNIT-II		**Lecture Hrs:11**

Communication in DOS :Study of case studies for distributed environment, Issues in communication, message-oriented communication, remote procedure call, remote method invocation, stream-oriented 09 Syllabus for Bachelor of Technology Computer Engineering communication, communication between processes, unstructured Vs structured communication, blocking Vs non-blocking communication.

UNIT-III		**Lecture Hrs:12**

Synchronization: Introduction of synchronization, Clocks, events, Time in distributed systems 1. Cristian's algorithm 2.The Berkeley Algorithm, 3. Network Time Protocol (NTP) 4.Logical time and logical clocks 5.Lamport logical clock 6.vector clock

UNIT-IV		**Lecture Hrs:11**

Transaction and Concurrency Control: Basic concurrency control mechanism in DOS mutual exclusion in distributed environment, Transactions and Concurrency Control in distributed environment, distributed deadlocks in distributed environment.

UNIT-V		**Lecture Hrs:11**

Distributed and Shared Memory Management(DSM): Basic fundamentals of shared memory in DOS, Architecture and algorithm of distributed shared memory, advantages & challenges of DSM, Memory coherence, consistency model, consistency with uniprocessor system, consistency with multiprocessing environment.

Text Books:

1. . Andrew S. Tanenbaum & Maarten van Steen, Distributed Systems: Principles and Paradigms, Prentice-Hall(2002) ISBN0-13-088893-1
2. D. L. Galli, Distributed Operating Systems, Prentice-Hall(2000) ISBN0-13-079843-6

Reference Books:

1. Principles of Distributed Database Systems, M. Tamer Ozsu, Patrick Valduriez, Prentice Hall nternational
2. Distributed Operating Systems and Algorithms, Randy Chow, T. Johnson, Addison Wesley
3. Distributed Systems Concepts and Design, G. Coulouris, J. Dollimore, Addison Wesley

Program Elective Course-I

Foundations of Block Chain Technology

Course Code			**L**	**T**	**P**	**C**
Semester	**I**		**3**	**0**	**0**	**3**

Course Objectives:

Course Outcomes:

- Understand how Blockchain work, including private and public platforms
- Understand the technical underpinnings of Blockchain technology at sufficient depth to perform analysis.
- Apply various Blockchain concepts to analyze examples, proposals, case studies, and preliminary Blockchain system design discussions.
- Know and be able to apply the concepts, tools, and frameworks for building block chain decentralized applications. CO5 Design secure smart contract applications on Blockchain.

UNIT-I		**Lecture Hrs:10**

Introduction:
Anonymity, Decentralization, Issue with Trusted third party. Scalability Issues in Distributed systems.
Challenges in Current System: Single point of failure, DDOS, Trusted Obligations.

UNIT-II		**Lecture Hrs:09**

Concepts of Blockchain Systems: Cryptographic Primitives, Cryptographic Hash Functions, Digital Signatures,Aggregate Signature
Crypto and Security conpects: Merkel tree, DES, AES, Zero knowledge proofs.

UNIT-III		**Lecture Hrs:11**

Consensus Algorithms: Crash Faults, Byzantine Faults
Tolerance Algorithms: Consensus Protocols- The consensus problem- Byzantine Generals problem, Asynchronous Byzantine Agreement, PBFT, HOTSTUFF, Consensus mechanisms used in Bitcoin, Ethereum, Stellar.

UNIT-IV		**Lecture Hrs:12**

Applications: Crypto currency, BusinessApplications, Secure file storages, NFT, Tokens
Platforms: Permission less- Bitcoin: Transaction life cycle, Security of Transactions in Bitcoin,Privacy in Bitcoin, Attacks on Bitcoin, Double-spend attacks, Selfish mining
Ethereum:Smart contracts -App development in Ethereum network
Mining- Merkle Tree- Hardness of mining - Transaction verifiability
Permissioned:Hyperledger Fabric: Endorsement, Ordering, Commiting, Corda:Notary, Smart Contracts, UTXO.

UNIT-V		**Lecture Hrs:12**

Smart Contracts -Attacks, Applications & Use Cases
Blockchain (IoT):dvantages of integrating Blockchain to IoT, Trust Building, Cost Reduction, Accelerate Data Exchanges, Scaled Security for IoT.

Text Books:

1. Arvind Narayanan, “Bitcoin and Cryptocurrency Technologies- A Comprehensive

Introduction", Princeton University Press, 2016. 2. William Magnuson, "Blockchain Democracy-Technology, Law and the Rule of the Crowd", Cambridge University Press, 2020.
Reference Books:
1. Pethuru Raj, Kavita Saini, Chellammal Surianarayanan, "Blockchain Technology and Applications", CRC Press, 2021. 2. Chandramouli Subramanian, "Blockchain Technology", Universities Press, 2020. 3. Relevant Research Paper and While Papers.
Online Learning Resources:

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Program Elective Course-I

Advanced Internet of Things

Course Code			**L**	**T**	**P**	**C**
Semester	**I**		**3**	**0**	**0**	**3**

Course Objectives:

1. To introduce the terminology, technology and its applications.
2. To introduce the concept of M2M (machine to machine) with necessary protocols.
3. To introduce the Python Scripting Language which is used in many IoT devices.
4. To introduce the Raspberry PI platform, that is widely used in IoT applications.
5. To introduce the implementation of web based services on IoT devices.

Course Outcomes:

1. Interpret the vision of IoT from a global context.
2. Determine the Market perspective of IoT.
3. Compare and Contrast the use of Devices, Gateways and Data Management in IoT.
4. Implement state of the art architecture in IoT.
5. Illustrate the application of IoT in Industrial Automation and identify Real World Design.

UNIT-I		**Lecture Hrs:12**

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT-II		**Lecture Hrs:10**

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER .

UNIT-III		**Lecture Hrs:12**

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib.**packaging file handling application**

UNIT-IV		**Lecture Hrs:10**

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT-V		**Lecture Hrs:10**

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API.

Text Books:

1.Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities

Press, 2015, ISBN: 9788173719547
Reference Books:
1.Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014

Program Elective Course-II

Data Science

Course Code			**L**	**T**	**P**	**C**
Semester	**I**		**3**	**0**	**0**	**3**

Course Objectives:

1. Introduce students the concept and challenge of big data (3 V's: volume, velocity, and variety).
2. Teach students in applying skills and tools to manage and analyze the big data.
3. The students should acquire knowledge on how to design BI solutions for different BI targets and users.

Course Outcomes:

1. Organizational and individual decision-making.
2. Key concepts and current practices of business intelligence.
3. The individual, organizational and societal impacts of BI systems.
4. Analytical techniques used in business intelligence systems.
5. Integration of business intelligence into decision-making processes.

UNIT-I		**Lecture Hrs:10**

Introduction: Overview of Random variables and distributions, data science model building life cycle, data acquisition. Statistical learning: Assessing model accuracy, Bias-Variance Trade-Off, Descriptive Statistics, Dependent and Independent events.

UNIT-II		**Lecture Hrs:11**

Linear Regression: Simple and multiple linear regressions, Comparison of Linear regression with K-nearest neighbors. Simple Hypothesis Testing, Student's t-test, paired t and U test, correlation and covariance, tests for association; association rules and correlations; PCA and SVD.

UNIT-III		**Lecture Hrs:12**

Classification: Linear and Logistic Regression, Bayesian Learning, LDA, QDA, K-Nearest Neigbhour, and comparison of classification methods.

UNIT-IV		**Lecture Hrs:11**

Data Visualization and Graphical Analysis: Visualized exploratory data Analysis, Histograms and frequency polygons, Box-plots, Quartiles, Scatter Plots, Heat Maps. Matrix visualization, Scientific Design Choices in Data Visualization, Higher-dimensional Displays and Special Structures, Visual data mining.

UNIT-V		**Lecture Hrs:10**

Data Wrangling: Data Acquisition, Data Formats, Imputation, split-apply-combine paradigm. Descriptive Analytics: Data Warehousing and OLAP, Data Summarization, Data deduplication, Data Visualization using CUBEs. Case-Study discussion

Text Books:

1. Gareth James Daniela Witten Trevor Hastie, Robert Tibshirani, An Introduction to Statistical Learning with Applications in R, February 11, 2013,

2. Mark Gardener, Beginning R The statistical Programming Language, Wiley,2015.
Reference Books: 1. Han , Kamber, and J Pei, Data Mining Concepts and Techniques, 3rd edition, Morgan Kaufman, 2012. (Chapter 2 and Chapter4) 2. Chun-houh Chen, Wolfgang Hardle, Antony Unwin, Handbook of Data Visualization, Springer, 2008
Online Learning Resources:

Program Elective Course-II

WIRELESS ADHOC AND SENSOR NETWORKS

Course Code			L	T	P	C
Semester	I		3	0	0	3

Course Objectives:

1. To learn about the issues and challenges in the design of wireless ad hoc networks.
2. To understand the working of MAC and Routing Protocols for ad hoc and sensor networks.
3. To learn about the Transport Layer protocols and their QoS for ad hoc and sensor networks.
4. To understand various security issues in ad hoc and sensor networks and the corresponding solutions.

Course Outcomes:

1. Identify different issues in wireless ad hoc and sensor networks.
2. To analyze protocols developed for ad hoc and sensor networks.
3. To identify and understand security issues in ad hoc and sensor networks.

UNIT-I		Lecture Hrs:12

MAC & ROUTING IN AD HOC NETWORKS

Introduction – Issues and challenges in ad hoc networks – MAC Layer Protocols for wireless ad hoc networks – Contention-Based MAC protocols – MAC Protocols Using Directional Antennas – Multiple-Channel MAC Protocols – Power-Aware MAC Protocols – Routing in Ad hoc Networks – Design Issues – Proactive, Reactive and Hybrid Routing Protocols

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UNIT-II		Lecture Hrs:10

TRANSPORT & QOS IN AD HOC NETWORKS

TCP‟s challenges and Design Issues in Ad Hoc Networks – Transport protocols for ad hoc networks – Issues and Challenges in providing QoS – MAC Layer QoS solutions – Network Layer QoS solutions – QoS Model

UNIT-III		Lecture Hrs:11

MAC & ROUTING IN WIRELESS SENSOR NETWORKS

Introduction – Applications – Challenges – Sensor network architecture – MAC Protocols for wireless sensor networks – Low duty cycle protocols and wakeup concepts – Contention- Based protocols – Schedule-Based protocols – IEEE 802.15.4 Zigbee – Topology Control – Routing Protocols.

UNIT-IV		Lecture Hrs:11

TRANSPORT & QOS IN WIRELESS SENSOR NETWORKS

Data-Centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Congestion Control in network processing – Operating systems for wireless sensor

networks – Examples

UNIT-V		Lecture Hrs:10

SECURITY IN AD HOC AND SENSOR NETWORKS

Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Anti-tamper techniques – Water marking techniques – Defense against routing attacks - Secure Ad hoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS

Text Books:

1. C.Siva Ram Murthy and B.S.Manoj, ―Ad Hoc Wireless Networks – Architectures and 2 Protocols‖, Pearson Education, 2006.
2. Holger Karl, Andreas Willing, ―Protocols and Architectures for Wireless Sensor Networks‖, John Wiley & Sons, Inc., 2005.

Reference Books:

1. Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, ―Ad Hoc Mobile Wireless Networks‖, Auerbach Publications, 2008.
2. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, ―Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition)‖, World Scientific Publishing, 2011.
3. Waltenegus Dargie, Christian Poellabauer, ―Fundamentals of Wireless Sensor Networks Theory and Practice‖, John Wiley and Sons, 2010
4. Xiang-Yang Li , "Wireless Ad Hoc and Sensor Networks: Theory and Applications‖, 1227 th edition, Cambridge university Press,2008.

Online Learning Resources:

Program Elective Course-II

Soft Computing

Course Code			L	T	P	C
Semester	I		3	0	0	3

Course Objectives:

The main objective of the Soft Computing Techniques to Improve Data Analysis Solutions is to strengthen the dialogue between the statistics and soft computing research communities in order to cross-pollinate both fields and generate mutual improvement activities. Soft Computing is a consortia of methodologies which collectively provide a body of concepts and techniques for designing intelligent systems.

Course Outcomes:

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UNIT-I		Lecture Hrs:11

Introduction: What is Soft Computing? Difference between Hard and Soft computing, Requirement of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.

UNIT-II		Lecture Hrs:10

Neural Networks: What is Neural Network, Learning rules and various activation functions, Single layer Perceptrons , Back Propagation networks, Architecture of Backpropagation(BP) Networks, Backpropagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications.

UNIT-III		Lecture Hrs:11

Fuzzy Systems: Fuzzy Set theory, Fuzzy versus Crisp set, Fuzzy Relation, Fuzzification, Minmax Composition, Defuzzification Method, Fuzzy Logic, Fuzzy Rule based systems, Predicate logic, Fuzzy Decision Making, Fuzzy Control Systems, Fuzzy Classification.

UNIT-IV		Lecture Hrs:12

Genetic Algorithm: History of Genetic Algorithms (GA), Working Principle, Various Encoding methods, Fitness function, GA Operators- Reproduction, Crossover, Mutation, Convergence of GA, Bit wise operation in GA, Multi-level Optimization.

UNIT-V		Lecture Hrs:10

Hybrid Systems: Sequential Hybrid Systems, Auxiliary Hybrid Systems, Embedded Hybrid Systems, Neuro-Fuzzy Hybrid Systems, Neuro-Genetic Hybrid Systems, Fuzzy-Genetic Hybrid Systems.

Text Books:

1. Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, S.Rajasekaran, G. A. Vijayalakshami, PHI.

2. Genetic Algorithms: Search and Optimization, E. Goldberg
Reference Books:
1. Neuro-Fuzzy Systems, Chin Teng Lin, C. S. George Lee, PHI. 2. Build_Neural_Network_With_MS_Excel_sample by Joe choong.
Online Learning Resources:

ADVANCED DATA STRUCTURES & ALGORITHMSLAB

Course Code			L	T	P	C
Semester	I		0	0	4	2

1. Write a Java programs that use both recursive and non-recursive functions for implementing the following searching methods:
   a) Linear search b) Binary search
2. Write Java programs to implement the following using arrays and linked lists and List ADT
3. Write Java programs to implement the following using an array.
   a) Stack ADT b) Queue ADT
4. Write a Java program that reads an infix expression and converts the expression to postfix form. (Use stacks ADT).
5. Write Java programs to implement the following using a singly linked list. a) Stack ADT b) Queue ADT
6. Write Java programs to implement the dequeue(double ended queue) ADT using a) Array b) Singly linked list c) Doubly linked list.
7. Write a Java program to implement priority queue ADT.
8. Write a Java program to perform the following operations:
9. Construct a binary search tree of elements.
10. Search for a key element in the above binary search tree.
11. Delete an element from the above binary search tree.
12. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.
13. Write a Java program to implement Dijkstra's algorithm for Single source shortest path problem.
14. Write Java programs for the implementation of BFS and DFS for a given graph.
15. Write Java programs for implementing the following sorting methods:
    a)Bubble sort b) Insertion sort c) Quick sort
    d) Merge sort e) Heap sort f) Radix sort g) Binary tree sort

Machine Learning Lab

Course Code			L	T	P	C
Semester	I		0	0	4	2

1. Implement and demonstratethe FIND-Salgorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithmto output a description of the set of all hypotheses consistent with the training examples.

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge toclassify a new sample.

4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.

5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

Research Methodology and IPR

Course Code			L	T	P	C
Semester	I		2	0	0	2

Course Objectives:

1. To understand the research problem.
2. To know the literature studies, plagiarism and ethics
3. To get the knowledge about technical report writing
4. To analyze the nature of intellectual property rights and new developments
5. To know the patent rights

Course Outcomes:

1. Understand research problem formulation. 1
2. Analyze research related information
3. Follow research ethics
4. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasise the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.

UNIT-I		Lecture Hrs:07

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.

UNIT-II		Lecture Hrs:08

Sampling Design - steps in Sampling Design -Characteristics of a Good Sample Design - Random Sampling Design.

Data collection Methods - Primary Data - Secondary data.

Correlation and Regression Analysis - Method of Least Squares - Regression vs Correlation - Correlation vs Determination - Types of correlations and their Applications.

UNIT-III		Lecture Hrs:08

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 - Multi-Variate Analysis.

UNIT-IV		Lecture Hrs:07

Introduction To intellectual Property:Types of Intellectual Property

Law of Copy Rights: Fundamental Of Copy Right Law, Rights of reproductions, Rights to perform the work publicly. Copy Right Registration.

Law of Patents: Foundation of Patent Law, Patent searching Law, Owner Ship Rights and Transfer.

UNIT-V		Lecture Hrs:06

Trade Marks: Purpose And Function of Trade Marks, Acquisition of Trade Mark Rights,

Protectable Matter, Selecting And Evaluating Trade Mark.

Trade Secrets : Trade Secrete Law, Determination Of Trade Secrete Status, Liability For Misappropriations Of Trade Secrets.

Text Books:

1. Research Methodology:Methods And Techniques - C.R.Kothari, 2nd Edition,New Age Intemational Publishers.
2. Intellectual Property Right, Deborah- E' Bouchoux, Cengage Learing.

Reference Books:

1. Research Methodology: A Step By Step Guide For Beginners- Ranjit Kumar, Sage Publications (Available As pdf On Internet).
2. Intellectual Property nilnr-uteashmy T re Knowledge Economy, Prabuddha Ganguli' Tate Mc Graw Hill Publishing Company Ltd',

Online Learning Resources:

Audit Course-I

Pedagogy Studies

Course Code			L	T	P	C
Semester	I		2	0	0	0

Course Objectives:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.
5. Review existing evidence on the review topic to inform programme design and policy making
6. Identify critical evidence gaps to guide the development.

Course Outcomes:

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

UNIT-I		**Lecture Hrs: 8**

Introduction and Methodology:Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education.Conceptual framework, Research questions. Overview of methodology and Searching.

UNIT-II		**Lecture Hrs: 7**

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT-III		**Lecture Hrs: 7**

Evidence on the effectiveness of pedagogical practices: Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school
Curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogicalpractices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT-IV		**Lecture Hrs: 7**

Professional development: alignment with classroom practices and follow-up support Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes.

UNIT-V		**Lecture Hrs: 7**

Research gaps and future directions: Research design, Context Pedagogy, Teacher education, Curriculum and assessment.

Text Books:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31

(2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.

Reference Books:

1. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
2. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
3. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.

Online Learning Resources:

M.Tech I Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

Artificial Intelligence

L	T	P	C
3	0	0	3

Course Objectives:

- This course is designed to:
- Define Artificial Intelligence and establish the cultural background for study
- Understand various learning algorithms
- Explore the searching and optimization techniques for problem solving
- Provide basic knowledge on Natural Language Processing and Robotics

UNIT – I:

What is AI, Foundations of AI, History of AI, The State of Art.

Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

Learning Outcomes:

At the end of this unit, the student will be able to

• Recognize the importance of Artificial Intelligence	**L1**
• Identify how intelligent agent is related to its environment	**L2**
• Build an Intelligent agent	**L3**

UNIT – II

Solving Problems by searching: Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

Learning Outcomes:

At the end of this unit, the student will be able to

• Explain how an agent can formulate an appropriate view of the problem it faces.	**L2**
• Solve the problems by systematically generating new states	**L3**
• Derive new representations about the world using process of inference	**L5**

UNIT – III: **8hrs**

Reinforcement Learning: Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL 10 Page Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.

Learning Outcomes:

At the end of this unit, the student will be able to

• Examine how an agent can learn from success and failure, reward and punishment.	**L5**
• Develop programs that make queries to a database, extract information from texts, and retrieve relevant documents from a collection using Natural Language Processing.	**L6**

UNIT–IV:

Natural Language for Communication: Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Develop programs that translate from one language to another, or recognize spoken words.	**L6**
• Explain the techniques that provide robust object recognition in restricted context.	**L2**
•	
UNIT – V:	
Robotics: Introduction, Robot Hardware, Robotic Perception, Planning to move, planning uncertain movements, Moving, Robotic software architectures, application domains Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right direction, What if AI does succeed.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Explain the role of Robot in various applications. .	**L2**
• List the main philosophical issues in AI.	**L1**
Text Books:	
1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2019.	
Reference Books:	
1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.	
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.	
Course Outcomes:	
At the end of this Course the student will be able to	
• Apply searching techniques for solving a problem (L3)	**L3**
• Design Intelligent Agents (L6)	**L6**
• Develop Natural Language Interface for Machines (L6)	**L6**
• Design mini robots (L6)	**L6**
• Summarize past, present and future of Artificial Intelligence (L5)	**L5**

M.Tech I Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

Cyber Security

L	T	P	C
3	0	0	3

Course Objectives:

This course is designed to:

- Understand essential building blocks and basic concepts of cyber security
- Explore Web security and Network security
- Explain the measures for securing the networks and cloud
- Understand privacy principles and policies
- Describe the legal issues and ethics in computer security

UNIT – I:

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control, and Cryptography, Authentication, Access Control, Cryptography. Programs and Programming: Unintentional (Non-malicious) Programming Oversights, Malicious Code—Malware, Countermeasures.

Learning Outcomes:

At the end of this unit, the student will be able to

• Explain Vulnerabilities, threats and. Counter measures for computer security	**L2**
• Interpret the design of the malicious code	**L2**

UNIT – II

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks. Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

Learning Outcomes:

At the end of this unit, the student will be able to

• Outline the attacks on browser, Web and email.	**L2**
• Explain the security aspects of Operating Systems.	**L3**

UNIT – III:

Network Security: Network Concepts, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service Strategic Defenses: Security Countermeasures, Cryptography in Network Security, Firewalls, Intrusion Detection 209 Page and Prevention Systems, Network Management . Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

Learning Outcomes:

At the end of this unit, the student will be able to

• Identify the network security threats and attacks.	**L3**
• Design the Counter measures to defend the network security attacks.	**L6**

UNIT–IV:

Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed. Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

Learning Outcomes:

At the end of this unit, the student will be able to

• Interpret the need for Privacy and its impacts of Emerging Technologies.	**L2**
• Explain how to handle incidents and deal with Disaster.	**L2**

UNIT – V:

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics, Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

Learning Outcomes:

At the end of this unit, the student will be able to

• Adapt legal issues and ethics in computer security.	**L6**
• Elaborate on the Emerging topics.	**L6**

Text Books:

1.Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5th edition

2. Schneier, Bruce. Applied Cryptography, Second Edition, John Wiley & Sons, 1996.

Reference Books:

1. Rhodes-Ousley, Mark. Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts and Practice, McGraw-Hill, 2013.

2. Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT and Infosec Managers. Boston, MA: Course Technology, 2011.

Course Outcomes:

At the end of this Course the student will be able to

• Illustrate the broad set of technical, social & political aspects of Cyber Securityand security management methods to maintain security protection	**L2**
• Assess the vulnerabilities and threats posed by criminals, terrorist and nation statesto 210 Page national infrastructure	**L5**
• Identify the nature of secure software development and operating systems	**L3**
• Demonstrate the role security management in cyber security defense	**L2**
• Adapt the legal and social issues at play in developing solutions.	**L6**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

PE-III- Video Analytics

L	T	P	C
3	0	0	3

Course Objectives:

- To understand the need for video Analytics
- To understand the basic configuration of video analytics
- To understand the functional blocks of a video analytic system
- To get exposed to the various applications of video analytics

UNIT – I: VIDEO ANALYTIC COMPONENTS

Need for Video Analytics-Overview of video Analytics- Foreground extraction- Feature extraction- classifier - Preprocessing- edge detection- smoothening- Feature space-PCA-FLD-SIFT features.

Learning Outcomes:

At the end of this unit, the student will be able to

• Explain Need for Video Analytics	**L2**
• Discuss about the Feature space of video analytics	**L2**

UNIT – II FOREGROUND EXTRACTION

Background estimation- Averaging- Gaussian Mixture Model- Optical Flow based- Image Segmentation- Region growing- Region splitting-Morphological operations- erosion-Dilation- Tracking in a multiple camera environment

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the Image Segmentation.	**L2**
• Explain the Tracking in a multiple camera environment.	**L3**

UNIT – III: CLASSIFIERS

Neural networks (back propagation) - Deep learning networks- Fuzzy Classifier- Bayesian classifier-HMM based classifier

Learning Outcomes:

At the end of this unit, the student will be able to

• Identify the back propagation.	**L3**
• Design the Fuzzy Classifier.	**L6**

UNIT–IV:VIDEO ANALYTICS FOR SECURITY

Abandoned object detection- human behavioral analysis -human action recognition- perimeter security- crowd analysis and prediction of crowd congestion.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the human action recognition.	**L2**
• Explain perimeter security.	**L2**

UNIT – V: VIDEO ANALYTICS FOR BUSINESS INTELLIGENCE & TRAFFIC MONITIRING AND ASSISTANCE

Customer behavior analysis - people counting- Traffic rule violation detection- traffic congestion identification for route planning- driver assistance- lane change warning

Learning Outcomes:

At the end of this unit, the student will be able to

• Explain the lane change warning.	**L6**
• Explain the traffic congestion identification for route planning.	**L6**

Text Books:

1. Graeme A. Jones (Editor), Nikos Paragios (Editor), Carlo S. Regazzoni (Editor) Video-Based Surveillance Systems: Computer Vision and Distributed Processing , Kluwer academic publisher, 2001.

2. Nilanjan Dey (Editor), Amira Ashour (Editor) and Suvojit Acharjee (Editor), Applied Video Processing in Surveillance and Monitoring Systems (IGI global) 2016

Reference Books:

1. Zhihao Chen (Author), Ye Yang (Author), Jingyu Xue (Author), Liping Ye (Author), Feng Guo (Author), The Next Generation of Video Surveillance and Video Analytics: The Unified Intelligent Video Analytics Suite, CreateSpace Independent Publishing Platform, 2014.
2. Caifeng Shan (Editor), Fatih Porikli (Editor), Tao Xiang (Editor), Shaogang Gong (Editor) Video Analytics for Business Intelligence, Springer, 2012.

Course Outcomes:

At the end of this Course the student will be able to

• Design video analytic algorithms for security applications	**L2**
• Design video analytic algorithms for business intelligence	**L5**
• Design custom made video analytics system for the given target applicatio	**L3**

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PE-III - NATURAL LANGUAGE PROCESSING

L	T	P	C
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Course Objectives:

- Explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP)
- Discuss approaches to syntax and semantics in NLP.
- Examine current methods for statistical approaches to machine translation.
- Explore machine learning techniques used in NLP.

UNIT – I:

Introduction to Natural language The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English Syntax.

Learning Outcomes:

At the end of this unit, the student will be able to

• Classify various NLP Applications	**L2**
• Apply the logic by using Python Programming	**L3**
• List the AI Languages	**L1**
• Outline the Linguistic Background	**L2**

UNIT – II

Grammars and Parsing Grammars and Parsing- Top- Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayees Rule, Shannon game, Entropy and Cross Entropy.

Learning Outcomes:

At the end of this unit, the student will be able to

• Demonstrate the Top- Down and Bottom-Up Parsing techniques .	**L2**
• Apply Bayes Rule, Shannon game, Entropy and Cross Entropy.	**L3**
• Develop game playing strategies using Shannon game.	**L3**

UNIT – III:

Grammars for Natural Language Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

Learning Outcomes:

At the end of this unit, the student will be able to

• Classify Grammars for Natural Language	**L2**
• Explain Hold Mechanisms in ATNs.	**L2**
• Explain Human Preferences in Parsing.	**L2**

UNIT–IV:

Semantic Interpretation Semantic & Logical form, Word senses & ambiguity, The basic logical form language, Encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic roles, Speech acts & embedded sentences, Defining semantics structure model theory.
Language Modeling Introduction, n-Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling.

Learning Outcomes:

At the end of this unit, the student will be able to

• Distinguish Language model Evaluation	**L4**
• List the types of Language Models	**L1**

UNIT – V:

Machine Translation Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status. Anusaraka or Language Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Giving up Agreement in Anusarsaka Output, Language Bridges.

Learning Outcomes:

At the end of this unit, the student will be able to

• Apply Machine Translation techniques.	**L3**
• Elaborate Multilingual Information Retrieval and Multilingual Automatic Summarization.	**L6**

Text Books:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Multilingual Natural Language Processing Applications : From Theory To PracticeDaniel M.Bikel and Imed Zitouni, Pearson Publications.
3. Natural Language Processing, A paninian perspective, Akshar Bharathi,Vineet chaitanya,Prentice –Hall of India.

Reference Books:

1. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008.
3. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

Course Outcomes:

At the end of this Course the student will be able to

• Build NLP applications using Python.	**L6**
• Apply various Parsing techniques, Bayes Rule, Shannon game, Entropy and Cross Entropy.	**L3**
• Explain the fundamentals of CFG and parsers and mechanisms in ATN's.	**L2**
• Apply Semantic Interpretation and Language Modeling..	**L3**
• Interpret Machine Translation and multilingual Information Retrieval systems and Automatic Summarization.	**L2**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

PE-III- DEEP LEARNING

L	T	P	C
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Course Objectives:

- Demonstrate the major technology trends driving Deep Learning
- Build, train and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyze the key parameters and hyper parameters in a neural network's architecture

UNIT – I:

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis. Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand linear algebra in the deep learning context	**L2**
• Utilize probability and information theory in machine/deep learning applications	**L3**

UNIT – II

Machine Learning: Basics and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feedforward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

Learning Outcomes:

At the end of this unit, the student will be able to

• Illustrate machine learning basics leads to deep learning	**L2**
• Contrast super and unsupervised learning	**L2**

UNIT – III:

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier. Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and MetaAlgorithms.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• Evaluate Regularization Problems for Deep learning	**L5**
• Apply optimization for Training Deep Learning models	**L3**
UNIT – IV:	
Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Appraise Basic Convolution Functions	**L5**
• Develop Efficient Convolution Algorithms	**L3**
UNIT – V:	
Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Illustrate Recurrent and Recursive Neural Networks .	**L2**
• Apply Auto encoders and Deep Generative Models .	**L3**
Text Books:	
1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press,2016.	
2. osh Patterson and Adam Gibson, "Deep learning: A practitioner's approach", O'Reilly Media, First Edition, 2017.	
Reference Books:	
1. Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers, 2019.	
2. Deep learning Cook Book, Practical recipes to get started Quickly, Douwe Osinga, O'Reilly, Shroff Publishers, 2019.	
Course Outcomes:	
At the end of this Course the student will be able to	
• Apply linear algebra and probability theory in the deep learning applications.	**L3**
• Elaborate the challenges and motivations to Deep learning .	**L6**
• Elaborate the challenges and motivations to Deep learning .	**L6**
• Build a convolutional neural network .	**L6**
• Build and train RNN and LSTMs.	**L6**

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PE-IV- NOSQL Databases

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the basics of NOSQL databases.
- Understand the NoSQL stores
- Explain the principles and practices of Structure of Data

UNIT – I:

Overview and History of NoSQL Databases. Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points.

Learning Outcomes:

At the end of this unit, the student will be able to

• Explain different types of NoSQL Databases.	**L1**
• Illustrate the Emergence of NoSQL.	**L2**
• Outline the application and Integration of NoSQL Databases.	**L2**

UNIT – II

Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Replication and sharding, MapReduce on databases.

Learning Outcomes:

At the end of this unit, the student will be able to

• Compare Relational Database to NoSql stores	**L1**
• Explain the challenges of Nosql approach .	**L2**
• Explain Sharding and Replication.	**L2**

UNIT – III:

NoSQL Key/Value databases using MongoDB, Document Databases, Document oriented Database Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

• Outline the features of key/Value databases.	**L2**
• Explain the Document-oriented NoSQL databases.	**L2**
• Illustrate E-commerce applications and different aggregate structures.	**L3**

UNIT – IV:

Column- oriented NoSQL databases using Apache HBASE, Architecture of HBASE, Column-Family Data Store Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• Define column oriented NoSql Database.	**L3**
• Explain the Column-Family Data Store Features.	**L3**
• Summarize Event Logging, Content Management Systems.	**L4**
UNIT – V:	
NoSQL Key/Value databases using Riak, Key-Value Databases,Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data,Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Explain NoSQL Key/Value databases using riak.	**L2**
• Apply Nosql Development tools with suitable usecase.	**L3**
• Explain the detailed architecture and performance tune of Graph NoSQL databases.	**L6**
Text Books:	
1. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications,1st Edition ,2019.	
Reference Books:	
1. . https://www.ibm.com/cloud/learn/nosql-databases	
2. . https://www.coursera.org/lecture/nosql-databases/introduction-to-nosql-VdRNp	
3. . https://www.geeksforgeeks.org/introduction-to-nosql/	
4. . https://www.javatpoint.com/nosql-databa	
Course Outcomes:	
At the end of this Course the student will be able to	
• Explain and compare different types of NoSQL Databases	**L1**
• Compare and contrast RDBMS with different NoSQL databases	**L2**
• Demonstrate the detailed architecture and performance tune of Document-oriented NoSQL databases.	**L3**
• Explain performance tune of Key-Value Pair NoSQL databases.	**L5**
• Apply Nosql development tools on different types of NoSQL Databases.	**L6**

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PE-IV- AGILE METHODOLOGIES

L	T	P	C
3	0	0	3

Course Objectives:

- Master the art of agile development.
- Understand how an iterative, incremental development process leads to faster delivery of more useful software. Elucidate the essence of agile development methods
- Explain the principles and practices of extreme programming

UNIT – I:

Why Agile? , How to be Agile, Understanding XP, Values and Principles, Improve the Process, Eliminate Waste, Deliver Value.

Learning Outcomes:

At the end of this unit, the student will be able to

• Appraise the importance of Agile and the philosophy behind being Agile	**L5**
• Interpret the questions that helps to eliminate waste from the process and increase one's agility	**L2**

UNIT – II

Practicing XP-Thinking, Pair Programming, Energized Work, Informative Workspace, RootCause Analysis, Retrospectives, Collaborating, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting.

Learning Outcomes:

At the end of this unit, the student will be able to

• Apply practices to excel as mindful developers	**L3**
• Illustrate the eight practices to help a team and its stakeholders collaborate efficiently and effectively	**L2**

UNIT – III:

Releasing-Done Done, No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation.

Learning Outcomes:

At the end of this unit, the student will be able to

• Examine pushing software into production	**L4**
• Explain the importance of documentation in ensuring the long-term maintainability of the product at appropriate times.	**L2**

UNIT – IV:

Planning-Vision, Release Planning, Risk Management, Iteration Planning, Stories, Estimating.

Learning Outcomes:

At the end of this unit, the student will be able to

• List the eight practices that allows to control the chaos of endless possibility	**L1**

UNIT – V:

Developing-Incremental Requirements, Customer Tests, Test- Driven Development, Refactoring, Incremental Design and Architecture, Spike Solutions, Performance Optimization.

Learning Outcomes:

At the end of this unit, the student will be able to

• Outline the practices that keep the code clean and allow the entire team to contribute to development.	**L2**

Text Books:

2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press,2016.
3. osh Patterson and Adam Gibson, "Deep learning: A practitioner's approach", O'Reilly Media, First Edition, 2017.

Reference Books:

5. Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers, 2019.
6. Deep learning Cook Book, Practical recipes to get started Quickly, Douwe Osinga, O'Reilly, Shroff Publishers, 2019.

Course Outcomes:

At the end of this Course the student will be able to

• Adopt Extreme Programming	**L1**
• Create own agile method by customizing XP to a particular situation	**L6**

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PE-IV- Software Testing

L	T	P	C
3	0	0	3

Course Objectives:

- Acquire knowledge on distinct types of testing methodologie.
- Describe the principles and procedures for designing test cases.
- Understand the stages of testing from Development to acceptance testing

UNIT – I:

Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs. Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

Learning Outcomes:

At the end of this unit, the student will be able to

• Explain the purpose of Testing.	**L2**
• Interpret the need of testing	**L2**

UNIT – II

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques. Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

Learning Outcomes:

At the end of this unit, the student will be able to

• Apply data flow testing	**L3**
• Design Transaction flow testing	**L6**

UNIT – III:

Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.

Learning Outcomes:

At the end of this unit, the student will be able to

• Apply testing in various domains.	**L3**

UNIT – IV:

Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection. Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, Specifications.

Learning Outcomes:

At the end of this unit, the student will be able to

• Analyze the paths in testing.	**L4**
• Design testing for checking the logic	**L6**

UNIT – V:

State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, Testability Tips. Graph Matrices and Application: Motivational Overview, Matrix of Graph, Relations, Power of a Matrix, Node Reduction Algorithm, Building Tools.

Learning Outcomes:

At the end of this unit, the student will be able to

• Use state graphs for testing.	**L3**
• Create algorithms for node reduction	**L6**

Text Books:

1. Boris Beizer, "Software testing techniques", Dreamtech, second edition, 2002.

Reference Books:

1. Brian Marick, "The craft of software testing", Pearson Education
2. Yogesh Singh, "Software Testing", Camebridge.
3. P.C. Jorgensen, "Software Testing" 3rd edition, Aurbach Publications (Dist.by SPD).
4. N.Chauhan, "Software Testing", Oxford University Press

Course Outcomes:

At the end of this Course the student will be able to

• Examine issues on data storing , accessing from MongoDB, Redis, HBase and query processing and can develop suitable solutions.	**L1**
• Able to apply the features of NoSQL tand analyze the datasets	**L6**
• Compare and Contrast NoSQL databases with Relational Database Systems	**L6**
• Critically analyze and evaluate variety of NoSQL databases	**L6**
• Able to design and implement advanced queries using MangoDB, Redis, and HBase	**L6**

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PE IV- FUNDAMENTALS OF VR/AR/MR

L	T	P	C
3	0	0	3

Course Objectives:

- Explore the history of spatial computing and design interactions.
- Understand the foundational principles describing how hardware, computer vision
- algorithms function Learn Virtual reality animation and 3D Art optimization
- Demonstrate Virtual reality
- Introduce to the design of visualization tools

UNIT – I:

How Humans interact with Computers: Common term definition, introduction, modalities through the ages (pre- 20th century, through world war-II, post world war-II, the rise of personal computing, computer miniaturization), why did we just go over all of this?, types of common HCI modalities, new modalities, the current state of modalities for spatial computing devices, current controllers for immersive computing systems, a note on hand tracking and hand pose recognition. Designing for our Senses, Not our Devices: Envisioning a future, sensory technology explained, who are we building this future for?, sensory design, five sensory principles, Adobe's AR story.

Learning Outcomes:

At the end of this unit, the student will be able to

• Explain common modalities and their pros and cons.	**L2**
• Demonstrate Mapping modalities to current industry inputs	**L2**
• Explore the importance of design with spatial computing	**L5**

UNIT – II

Virtual Reality for Art: A more natural way of making 3D art, VR for animation. 3D art optimization: Introduction, draw calls, using VR tools for creating 3D art, acquiring 3D models vs making them from scratch. How the computer vision that makes augmented reality possible works: Who are we?, a brief history of AR, how and why to select an AR platform, mapping, platforms, other development considerations, the AR cloud.

Learning Outcomes:

At the end of this unit, the student will be able to

• Utilize VR tools for creating 3D Animations	**L3**
• Analyze how and why to Select an AR Platform	**L6**

UNIT – III:

Virtual reality and augmented reality: cross platform theory: Why cross platform? The role of game engines, understanding 3D graphics, portabiltity lessons from video game design, simplifying the controller input. Virtual reality toolkit: open source framework for the community: What is VRTK and why people use it?, the history of VRTK, welcome to the steam VR unity toolkit, VRTK v4, the future of VRTK, success of VRTK. Three virtual reality and augmented reality development practices: Developing for virtual reality and augmented reality, handling locomotion, effective use of audio, common interaction paradigms.

Learning Outcomes:

At the end of this unit, the student will be able to	
• Explain why the design approach should be considered at a holistic high level based on the goal of the experience.	**L2**
• Build VR solutions using Virtual reality toolkit	**L6**
• Interpret the development practices in three Virtual reality and Augmented reality development	**L2**
UNIT – IV:	
Data and machine learning visualization design and development in spatial computing: Introduction, understanding data visualization, principles for data and machine learning visualization design and development in spatial computing, why data and machine learning visualization works in spatial computing, 2D data visualization vs 3D data visualization in spatial computing, interactivity in data visualizations and in spatial computing, animation, failures in data visualization, good data visualization design optimize 3D spaces, data representations, info graphics, and interactions, defining distinctions in data visualization and big data for machine, how to create data visualization: data visualization creation pipeline, webXR, data visualization challenges in XR, data visualization industry use case examples of data visualization, 3D reconstruction and direct manipulation of real world data, data visualization is for everyone, hands on tutorials, how to create data visualization, resources.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Understand, define, and set data and machine visualization design and development principles in embodied reality	**L1**
• Demonstrate best practices, and practical tools to create beautiful and functional data visualizations.	**L2**
UNIT – V:	
Character AI and Behaviors: Introduction, behaviors, current practice: Reactive AI, more intelligence in the system, Deliberative AI, machine learning. The virtual and augmented reality health technology ecosystem: VR/AR health technology application design, standard UX isn't intuitive, tutorial: insight Parkinson's experiment, companies, case studies from leading Academic institutions.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Design a behavioral AI system for a video game	**L6**
• Identify issues related to design of virtual reality (VR) and augmented reality (AR) experiences deployed in a health-care context	**L6**
• Explain the use of motion data from controllers to reduce the visible tremor of a Parkinson's patient in a virtual environment	**L2**
Text Books:	
1.Erin Pangilinan, Steve lukas, and Vasanth Mohan, "Creating Augmented & Virtual Realities", 1st edition, O'REILLY, 2019.	
Reference Books:	
1. Steve Aukstakalnis, "Practical Augmented Reality", Pearson Education, 2017.	
Course Outcomes:	
At the end of this Course the student will be able to	

• Explain how the humans interact with computers	**L2**
• Apply technical and creative approaches to make successful applications and experiences.	**L3**
• Design audio and video interaction paradigms	**L6**
• Design Data visualization tools	**L6**
• Apply VR/MR/AR in various fields in industry	**L3**

M.Tech I Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

Audit Course-II- Disaster Management

L	T	P	C
3	0	0	3

Course Objectives:

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
- Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
- Understand the 'relief system' and the 'disaster victim.'
- Describe the three planning strategies useful in mitigation.
- Identify the regulatory controls used in hazard management.
- Describe public awareness and economic incentive possibilities.
- Understand the tools of post-disaster management.

UNIT – I:

Natural Hazards And Disaster Management: Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

Learning Outcomes:

At the end of this unit, the student will be able to

• To know about the natural hazards and its management.	**L2**
• To understand about the global warming, cyclones and tsunamis	**L2**

UNIT – II

Man Made Disaster And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism -threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.

Learning Outcomes:

At the end of this unit, the student will be able to

• To know about the fire hazards and solid waste management	**L3**
• To understand about the emerging infectious diseases and aids their management.	**L6**

UNIT – III:

Risk and Vulnerability: Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

Learning Outcomes:

At the end of this unit, the student will be able to	
• To know about the regulations of building codes and land use planning related to risk and vulnerability	**L2**
• To understand about the financial management of disaster and related losses	**L6**
UNIT – IV:	
Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges-mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and trainingtransformable indigenous knowledge in disaster reduction.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• To know about the technological aspects of disaster management	**L1**
• To understand about the factors for disaster reduction	**L2**
UNIT – V:	
Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resiliencebuilding community capacity for action.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• To impart the education related to risk reduction in schools and communities	**L6**
Text Books:	
1. Rajib shah & R R Krishnamurthy "Disaster Management" – Global Challenges and Local Solutions' Universities press. (2009),.	
2. Tushar Bhattacharya, "Disaster Science & Management" Tata McGraw Hill Education Pvt. Ltd., New Delhi.	
3. Jagbir Singh "Disaster Management" – Future Challenges and Opportunities' I K International Publishing House Pvt. Ltd. (2007),	
Reference Books:	
1. Harsh. K . Gupta "Disaster Management edited", Universities press, 2003.	
Course Outcomes:	
At the end of this Course the student will be able to	
• Affirm the usefulness of integrating management principles in disaster mitigation work	**L2**
• Distinguish between the different approaches needed to manage pre- during and postdisaster periods.	**L3**
• Explain the process of risk management	**L6**
• Relate to risk transfer	**L6**

M.Tech I Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

ARTIFICIAL INTELLIGENCE LABORATORY

L	T	P	C
3	0	0	3

Course Objectives:

- Explore the methods of implementing algorithms using artificial intelligence techniques
- Illustrate search algorithms
- Demonstrate building of intelligent agents

List of Experiments:

1.Write a program to implement DFS and BFS

2.Write a Program to find the solution for travelling salesman Problem

3.Write a program to implement Simulated Annealing Algorithm

4.Write a program to find the solution for wampus world problem

5.Write a program to implement 8 puzzle problem

6.Write a program to implement Towers of Hanoi problem

7.Write a program to implement A* Algorithm

8.Write a program to implement Hill Climbing Algorithm

9.Build a Chatbot using AWS Lex, Pandora bots.

10.Build a bot which provides all the information related to your college.

11.Build a virtual assistant for Wikipedia using Wolfram Alpha and Python

12.The following is a function that counts the number of times a string occurs in another string:

```
 # Count the number of times string s1 is found in string s2
def countsubstring(s1,s2):
count = 0
for i in range(0,len(s2)-len(s1)+1):
 if s1 == s2[i:i+len(s1)]:
count += 1
return count
```

For instance, countsubstring('ab','cabalaba') returns 2.

Write a recursive version of the above function. To get the rest of a string (i.e. everything but the first character).

13.Higher order functions. Write a higher-order function count that counts the number of elements in a list that satisfy a given test. For instance: count(lambda x: x>2, [1,2,3,4,5]) should return 3, as there are three elements in the list larger than 2. Solve this task without using any existing higher-order function.

14.Brute force solution to the Knapsack problem. Write a function that allows you to generate random problem instances for the knapsack program. This function should generate a list of items containing N items that each have a unique name, a random size in the range 1 ..... 5 and a random value in the range 1 ..... 10.

Next, you should perform performance measurements to see how long the given knapsack solver take to solve different problem sizes. You should peform atleast 10 runs with different randomly generated problem instances for the problem sizes 10,12,14,16,18,20 and 22. Use a backpack size of 2:5 x N for each value problem size N. Please note that the method used to generate random numbers can also affect performance, since different distributions of values can make the initial conditions of the problem slightly more or less demanding. How much longer time does it take to run this program when we increase the number of items? Does the backpack size affect the answer? Try running the above tests again with a backpack size of 1 x N and with 4:0 x N.

15.Assume that you are organising a party for N people and have been given a list L of people who, for social reasons, should not sit at the same table. Furthermore, assume that you have C tables (that are infinitly large).
Write a function layout(N,C,L) that can give a table placement (ie. a number from 0 : : :C -1) for each guest such that there will be no social mishaps.
For simplicity we assume that you have a unique number 0 .....N-1 for each guest and that the list of restrictions is of the form [(X,Y), ...] denoting guests X, Y that are not allowed to sit together. Answer with a dictionary mapping each guest into a table assignment, if there are no possible layouts of the guests you should answer False.

Reference Books:

1. 1.Tensorflow: https://www.tensorflow.org/
2. Pytorch: https://pytorch.org/ https://github.com/pytorch
3. Keras: https://keras.io/ https://github.com/keras-team
4. Theano: http://deeplearning.net/software/theano/ https://github.com/Theano/Theano
5. Cafee2: https://caffe2.ai/ https://github.com/caffe2
6. Deeplearning4j: https://deeplearning4j.org/
7. Scikit-learn:https://scikit-learn.org/stable/ https://github.com/scikit-learn/scikit-learn
8. Deep Learning.Ai: https://www.deeplearning.ai/
9. OpenCv: https://opencv.org/ https://github.com/qqwweee/keras-yolo3
10. YOLO: https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/ nVIDIA:CUDA https://developer.nvidia.com/cuda-math-library
11. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press, 2004.
12. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
13. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.
14. Artificial Neural Networks, B. Yagna Narayana, PHI
15. Artificial Intelligence , 2nd Edition, E.Rich and K.Knight, TMH.
16. Artificial Intelligence and Expert Systems, Patterson, PHI.

Course Outcomes:

At the end of this Course the student will be able to

• Implement search algorithms	**L3**
• Solve Artificial intelligence problems	**L3**

M.Tech I Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

Cyber Security Laboratory

L	T	P	C
3	0	0	3

List of Experiments:

1. TCP scanning using NMAP
2. Port scanning using NMAP
3. TCP / UDP connectivity using Netcat
4. Perform an experiment to demonstrate sniffing of router traffic by using the tool wireshark.
5. Perform an experiment how to use dumpsec.
6. Perform an experiment to sniff traffic using ARP Poisoning
7. Implementing the Secure Sockets Layer (SSL v2/v3) and Transport Layer Security (TLS v1) network protocols
8. Setup a honey pot and monitor the honey pot on network.

Course Outcomes:

At the end of this Course the student will be able to

• Implement the TCP	**L3**
• Solve TCP/UDP problems .	**L3**
• Solve the some security issues.	**L6**

II M.Tech I SEMESTER
JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
BIG DATA ANALYTICS
(Program elective-V)

L	T	P	C
3	0	0	3

Course Objectives:
1. Master the concepts of HDFS and Map Reduce framework.
2. Understand Hadoop Architecture.
3. Setup Hadoop Cluster and write Complex Map Reduce programs.
4. Perform Data Analytics using Hive.
5. Implement HBase and Map Reduce Integration.
6. Implement best Practices for Hadoop Development.
7. They will understood about R analytics Based on big data.

UNIT – 1: Introduction to Big Data **8 Hrs**

What is Big Data. Why Big Data is Important. Meet Hadoop. Data. Data Storage and Analysis. Comparison with other systems. Grid Computing. A brief history of Hadoop. Apache hadoop and the Hadoop EcoSystem. Linux refresher; VMWare Installation of Hadoop.

Learning Outcomes:

At the end of this unit, the student will be able to

- Student will be able to know where the Big data is used and its importance. **L2**
- Students will be able to know how the Big data will be handled and its problems. **L2**

UNIT – II: The design of HDFS **8 Hrs**

HDFS concepts. Command line interface to HDFS.Hadoop File systems. Interfaces. Java Interface to Hadoop. Anatomy of a file read. Anatomy of a file writes. Replica placement and Coherency Model. Parallel copying with distcp, Keeping an HDFS cluster balanced.

Learning Outcomes:

At the end of this unit, the student will be able to

- Students will be able to learn the importance of Hadoop. **L2**
- Students will be able to know about Doug Cutting and how the Hadoop came into existence. **L2**

UNIT – III: **8 Hrs**

Introduction. Analyzing data with unix tools. Analyzing data with hadoop. Java MapReduce classes (new API). Data flow, combiner functions, Running a distributed MapReduce Job. Configuration API. Setting up the development environment. Managing configuration. Writing a unit test with MRUnit. Running a job in local job runner. Running on a cluster.Launching a job. The MapReduce WebUI.

Learning Outcomes:

At the end of this unit, the student will be able to

- Students will be able to know about Doug Cutting and how the Hadoop came into existence. **L3**
- Student will be able to know about HDFS, MapReduce and Hadoop releases. **L4**

UNIT – IV: **7 Hrs**

Classic Mapreduce. Job submission. Job Initialization. Task Assignment. Task execution .Progress and status updates. Job Completion. Shuffle and sort on Map and reducer side. Configuration tuning. Map Reduce Types. Input formats. Output formats, Sorting. Map side and Reduce side joins.

Learning Outcomes:

At the end of this unit, the student will be able to

- Student will be able to know about HDFS, MapReduce and Hadoop releases. **L3**
- Students will be able to know how to write a program in Hadoop **L4**

UNIT – V: The Hive Shell

Hive services. Hive clients. The meta store. Comparison with traditional databases. Hive Ql. Hbasics. Concepts. Implementation. Java and Map reduce clients. Loading data, web queries.

Learning Outcomes:

At the end of this unit, the student will be able to

- Students will be able to know how to write a program in Hadoop **L4**
- Students will be able to know how Map and Reduce done in Hadoop **L5**
- Students will be able to know how to view information about jobs in web browser **L5**

Text Books:

1. Tom White, Hadoop,"The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012.
2. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch ,"Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012.

Reference Books:

1. Hadoop for Dummies by Dirk deRoos ,Paul C.Zikopoulos,Roman B.MelnyK,Bruce Brown,Rafael Coss

Course Outcomes:

At the end of this Course the student will be able to

- Student will be able to know where the Big data is used and its importance. **L2**
- Students will be able to know how the Big data will be handled and its problems. **L3**
- Students will be able to learn the importance of Hadoop. **L3**
- Students will be able to know about Doug Cutting and how the Hadoop came into existence. **L4**
- Student will be able to know about HDFS, MapReduce and Hadoop releases. **L3**
- Students will be able to know how to write a program in Hadoop **L5**
- Students will be able to know how Map and Reduce done in Hadoop **L5**
- Students will be able to know how to view information about jobs in web browser **L6**

II M.Tech I SEMESTER
JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
WEB DESIGN AND MANAGEMENT
(Program Elective-V)

L	T	P	C
3	0	0	3

Course Objectives:
This course is designed to:
• To Learn the basic concepts in HTML, CSS, JavaScript
• To Understand the responsive design and development
• To learn the web project management and maintenance process
• To Design a Website with HTML, JS, CSS / CMS - Word press

UNIT – 1: WEB DESIGN - HTML MARKUP FOR STRUCTURE **8 Hrs**
Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5.

Learning Outcomes:
At the end of this unit, the student will be able to
- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT – II: CSS AND JAVASCRIPT **8 Hrs**
CSS - Formatting text - Colours and Background - Padding, Borders and Margins – Floating and positioning - Page Layout with CSS - Transition, Transforms and Animation – JavaScript - Using Java Script.

. **Learning Outcomes:**
At the end of this unit, the student will be able to
- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT – III: RESPONSIVE WEB DESIGN **8 Hrs**
Sass for Responsive Web Design - Marking Content with HTML5 - Mobile-First or DesktopFirst - CSS Grids, CSS Frameworks, UI Kits, and Flexbox for RWD - Designing small UIs by Large Finger - Images and Videos in Responsive Web Design - Meaningful Typography for Responsive Web Design.

Learning Outcomes:
At the end of this unit, the student will be able to
- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT – IV: WEB PROJECT MANAGEMENT **7 Hrs**
Project Life Cycle - Project Definition - Discovery and Requirements - Project Schedule and Budgeting - Running the project - Technical Documentation - Development, Communicaton, Documentation - QA and testing -Deployment - Support and operations.

Learning Outcomes:
At the end of this unit, the student will be able to
- Describe a software architecture using various documentation approaches and architectural description languages. **L5**
- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT – V: PROJECT CASE STUDY

Using HTML, CSS, JS or using Opensource CMS like Word press, design and develop a Website having Aesthetics, Advanced and Minimal UI Transitions based on the project - Host and manage the project live in any public hosting.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Jennifer Niederst Robbins, "Learning Web Design", O'REILLY 4th Edition
2. Ricardo Zea, "Mastering Responsive Web Design", PACKT Publishing, 2015
3. Justin Emond, Chris Steins, "Pro Web Project Management", Apress,2011

Reference Books:

1. Jon Duckett, "HTML and CSS: Design and Build Websites", John Wiley and Sons, edition 2014
2. Jon Duckett, Jack Moore, "JavaScript & JQuery: Interactive Front-End Web Development", John Wiley and Sons, edition 2014
3. Uttam K. Roy "Web Technologies" Oxford University Press, 13th impression, 2017 4. Word press - http://www.wpbeginner.com/category/wp-tutorials/

Course Outcomes:

Students will be able to:

1. Recognize the method of using layered approach for design . **L2**
2. Explain the functionality of each layer of a computer network. **L3**
3. Apply the knowledge of layered approach for the design of computer network software. **L4**
4. Analyze the performance of protocols of a computer network. **L4**
5. Recommend the protocols for different applications. **L5**
6. Propose new protocols for a computer networks. **L6**

II M.Tech I SEMESTER

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

MOBILE APPLICATION DEVELOPMENT

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle

UNIT – 1: 8 Hrs

Introduction Android Programming: What is Android, Activities, Linking Activities Using Intents, Fragments, Calling Built – in Applications using Intents, Displaying Notifications.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their understanding of the fundamentals of Android operating systems **L2**
- demonstrate their skills of using Android software development tools **L2**

UNIT – II: 8 Hrs

Android User Interface: Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Listening for UI Notifications.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to develop software with reasonable complexity on mobile platform **L3**
- demonstrate their ability to deploy software to mobile devices **L3**

UNIT – III: 8 Hrs

Designing User Interface with Views: Basic Views, Picker Views, Using List Views to Display Long Lists.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to debug programs running on mobile devices **L4**
- demonstrate their ability to deploy software to mobile devices **L4**

UNIT – IV: 7 Hrs

Displaying pictures and menus with views and Data Persistence: Views to Display pictures, menus with views, additional views, saving and loading user preferences, persisting data to files, creating and using databases.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their skills of using Android software development tools **L4**
- demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

UNIT – V: **08 Hrs**

Content Providers: Sharing data in android, using a content provider, creating your own content providers.

Messaging and Networking: SMS Messaging, Sending E-Mail, Networking

Location-Based Services: Displaying Maps, Getting Location Data.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to deploy software to mobile devices **L5**
- demonstrate their ability to debug programs running on mobile devices **L5**

Text Books:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India
2. Beginning Swift Programming, Wei-Meng Lee, December 2014, ISBN: 978-1-119-00931-3

Reference Books:

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Android Application Development for Java programming by James C. Sheusi, Cengage Learning
3. Android A Programmers Guide by Jerome DiMargio, TMH.

Course Outcomes:

At the end of this Course the student will be able to

- demonstrate their understanding of the fundamentals of Android operating systems **L3**
- demonstrate their skills of using Android software development tools **L4**
- demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

II M.Tech II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

ADVANCED DATA STRUCTURES

L	T	P	C
3	0	0	3

Course Objectives:

- Understand and apply linear data structures-List, Stack and Queue.
- Understand the graph algorithms.
- Learn different algorithms analysis techniques.
- Apply data structures and algorithms in real time applications.
- Able to analyze the efficiency of algorithm.

UNIT – I: Hashing –

General Idea, Hash Function, Separate Chaining, Hash Tables without linked lists: Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Hash Tables in the Standard Library, Universal Hashing, Extendible Hashing.

Learning Outcomes:

At the end of this unit, the student will be able to

• Develop the model from the Hash Tables in the Standard Library.	**L1**
• Analyze and design the Extendible Hashing.	**L1**

UNIT – II: Priority Queues (Heaps) –

Priority Queues (Heaps) – Model, Simple implementations, Binary Heap: Structure Property, Heap Order Property, Basic Heap Operations: insert, delete, Percolate down, Other Heap Operations.

Learning Outcomes:

At the end of this unit, the student will be able to

• Have an exposure for Binary Heap: Structure Property.	**L2**
• Apply, analyze, design and develop the Basic Heap Operations.	**L2**

UNIT – III: Trees – AVL

Single Rotation, Double Rotation, B-Trees, Multi-way Search Trees – 2-3 Trees: Searching for an Element in a 2-3 Tree, Inserting a New Element in a 2-3 Tree, Deleting an Element from a 2-3 Tree.

Learning Outcomes:

At the end of this unit, the student will be able to

• Design various estimation levels Multi-way Search Trees – 2-3 Trees	**L2**

UNIT – IV: Graphs Algorithms –

Graphs Algorithms – Elementary Graph Algorithms: Topological sort, Single Source Shortest Path Algorithms: Dijkstra's, Bellman-Ford, All-Pairs Shortest Paths: Floyd-Warshall's Algorithm.

Learning Outcomes:

At the end of this unit, the student will be able to

• Categorize various Topological sort	**L3**
• Sketch various artifacts sets for Floyd-Warshall's Algorithm.	**L4**

UNIT – V: Disjoint Sets –

Equivalence relation, Basic Data Structure, Simple Union and Find algorithms, Smart Union and Path compression algorithm..

Learning Outcomes:

At the end of this unit, the student will be able to

• Identify and describe the , Basic Data Structure	**L4**
• Determine an Smart Union and Path compression algorithm.	**L5**

Text Books:

1.Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, 4 th Edition, 2014, Pearson.

2. Introduction to Algorithms, Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 3 rd Edition, 2009, The MIT Press.

Reference Books:

1. Introduction to Algorithms, Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 3 rd Edition, 2009, The MIT Press.
2. Advanced Data Structures, Reema Thareja, S. Rama Sree, Oxford University Press, 2018.

Course Outcomes:

At the end of this Course the student will be able to

• Understand the basic principles and operations of data structures.	**L2**
• Apply Hashing, Disjoint sets and String Matching techniques for solving problems effectively.	**L3**
• Apply the concepts of advanced Trees and Graphs for solving problems effectively.	**L3**
• Analyze the given scenario and choose appropriate Data Structure for solving problems.	**L4**