MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE

Madanapalle

(UGC-AUTONOMOUS)

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Estd 1998

MASTER OF TECHNOLOGY

COMPUTER SCIENCE & ENGINEERING

COURSE STRUCTURE

&

DETAILED SYLLABI

For the students admitted to

Master of Technology Computer Science & Engineering from the academic year 2016-17 Batches onwards

M. Tech Regular Two Year P. G. Degree Course

VISION AND MISSION OF THE INSTITUTION

Vision

Become a globally recognized research and academic institution and thereby contribute to technological and socio-economic development of the nation

Mission

To foster a culture of excellence in research, innovation, entrepreneurship, rational thinking and civility by providing necessary resources for generation, dissemination and utilization of knowledge and in the process create an ambience for practice-based learning to the youth for success in their careers.

VISION AND MISSION OF THE DEPARTMENT

Vision

To become a Department recognized for its ability to provide quality education to the students and make them excel in the domain of electrical engineering, with research proficiency and ethics, to meet the challenges from society.

Mission

- To impart quality education and advancements in program of studies for producing engineers with scientific temperament and moral values in the field of electrical engineering
- To create and develop research culture with deep sense of commitment, so as to enable the industries to adopt the research outputs
- To enhance the technical dexterity, so as to find the suitable solutions in their respective domain, for welfare of the society

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

M.Tech. Computer Science & Engineering [CSE]

Revised-Curriculum Structure (2016-17)

I YEAR - I Semester

S. No	Course code	Course	Credits
1.	**16CSE101**	Advanced Operating Systems	4
2.	**16CSE102**	Advanced Data Structures and Algorithms	4
3.	**16CSE103**	Computer System Design	4
4.	**16CSE104**	Advanced Computer networks	4
5.	**16CSE105**	Object Oriented Analysis & Design Patterns	4
6.		**Elective-I**	4
	16CSE401	Software Engineering	
	16CSE402	Artificial Intelligence	
	16CSE403	Grid Computing	
7	**16CSE201**	Advanced Data Structures using Python Practicals	2
		Total	**26**

I YEAR - II Semester

S. No	Course code	Course	Credits
1.	**16CSE106**	Big Data Analytics	4
2.	**16CSE107**	Web Technologies	4
3.	**16CSE108**	Mobile Computing	4
4.	**16CSE109**	Advanced Databases	4
5.	**16CSE110**	Information Security and Cyber Forensics	4
6.		**Elective-II**	4
	16CSE404	Cloud Computing	
	16CSE405	Research Methodologies in Computer Science	
	16CSE406	Software Quality Assurance and Testing	
7.	**16CSE202**	Data Analytics and Web Technologies Practicals	2
		Total	**26**

II YEAR (III & IV Semesters)

S. No	Course code	Course	Credits
1	**16CSE5011**	Seminar	2
2	**16CSE602**	Project work	16

Marks Allocation

S.No	Description	Internal Marks			External Marks
1	Theory	Mid -Test	Assignment		50
		30	20		
2	Practical	Experiment	Record Work	Viva - voce	50
		30	10	10	
3	Seminar	50			50

M. Tech. I Year I Semester

16CSE101 ADVANCED OPERATING SYSTEMS

L	T	P	C
4	0	0	4

Course Description:
This course provides comprehensive and up-to-date coverage of the major developments in distributed Operating System, Multi-processor Operating System and Database Operating System. This course covers important theoretical foundations including Process Synchronization, Concurrency, Event ordering, Mutual Exclusion, Deadlock, Agreement Protocol, Security, Recovery and fault tolerance.

Course Objectives:
1. To examine the fundamental principles of distributed operating systems
2. To provide hands-on experiences in developing suitable algorithms for distributed system
3. To emphasis on OS resource security and protection and database operating system

UNIT I: DISTRIBUTED OPERATING SYSTEMS
Overview, Synchronization Mechanisms, Architectures of Distributed Systems, Theoretical Foundations. Distributed Mutual Exclusion: Preliminaries, A Simple solution to distributed mutual exclusion, Non-Token Based Algorithm, Lamport's Algorithm, RicartAgrawala algorithm. Distributed Deadlock detection, Agreement Protocols: System Model, Classification of Agreement Problem, solution to byzantine agreement problem.

UNIT II: DISTRIBUTED RESOURCE MANAGEMENT
Distributed File Systems: Architecture, Mechanisms for building distributed file systems; Distributed Shared memory: Algorithms for implementing DSM, Memory Coherence, Coherence protocols; Distributed Scheduling – Issues in Load distribution, Components of load distributing algorithm, Load distributing algorithms.

UNIT III: FAULT TOLERANCE
Failure Recovery and Fault Tolerance-Recovery: Classification of Failures, Backward and forward error recovery, recovery in concurrent systems, Checkpointing; Fault Tolerance: Commit protocols, nonblocking commit protocols, voting protocols, dynamic voting protocols, Failure resilient processes.

UNIT IV: PROTECTION AND SECURITY
Protection and Security-Resource Security and protection: Introduction, Preliminaries, Access Matrix Model, Implementation of Access Matrix, safety in Access matrix model. Multiprocessor Operating systems-Multiprocessor System Architectures – Multiprocessor operating systems.

UNIT V: DATABASE OPERATING SYSTEMS

Database Operating Systems-Introduction to Database Operating systems, Concurrency Control, Theoretical Aspects, Concurrency Control Algorithms – Basic synchronization primitives, lock based algorithms, Timestamp based algorithms.

Course Outcomes:

At the end of the course, students will be able to:

1. Understand the basic foundation in the design of advanced operating systems.
2. Devise algorithms for distributed file systems, distributed shared memory and distributed scheduling.
3. Assess the basis of the design of advanced operating systems such as failure recovery and fault tolerance.
4. Find the solutions for the problems encountered in the design of advanced operating systems.
5. Analyze algorithms for database operating systems

Text Book:

MukeshSinghal, NiranjanG.Shivaratri, Advanced Concepts in Operating Systems: Distributed Database, and Multiprocessor Operating Systems, Tata McGraw-Hill, 2001. ISBN: 0-07-047268-8.

Reference Books:

1. Pradeep K. Sinha, Distributed Operating Systems Concepts and Design, Prentice-Hall of India, 2005, ISBN: 81-203-1380-1
2. Mary Gorman, Todd Stubbs, and Introduction to Operating Systems: Advanced Course, Course Technology, 2001. ISBN: 0619059443.
3. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles, John Wiley and Sons, Seventh Edition, 2006. ISBN: 9812-53-176-9.

M. Tech. I Year I Semester

16CSE102 ADVANCED DATA STRUCTURES AND ALGORITHMS

L	T	P	C
4	0	0	4

Course Description:

This course covers data structures and algorithms. Data structures play a central role in modern computer science. You interact with data structures even more often than with algorithms (think Google, your mail server, and even your network routers). In addition, data structures are essential building blocks in obtaining efficient algorithms.

Course Objectives:

- To develop skills to design and analyze linear and non linear data structures.
- Develop algorithms for manipulating linked lists, stack, queues, trees, and graphs.
- Develop recursive algorithms as they apply to trees and graphs.
- To develop a base for advanced computer study.

UNIT-I

C++ Programming: Objects, Class Definition, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, dynamic memory allocation and deal location (new and delete), exception handling. Function over Loading.

Object-based Programming: Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions.

UNIT II

Data structures-Linear and non linear data structures, ADT concept, Linear List ADT, Array Representation, Linked representation, Representation of single, two dimensional arrays, sparse matrices and their representation. Singly linked lists -insertion, deletion, search operations, doubly linked lists-insertion, deletion operations, and circular lists.

UNIT III

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.

UNIT IV

Searching–Linear and binary search methods, Hashing-Hash functions, Collision Resolution methods-Open Addressing, Chaining Sorting –Bubble sort, Insertion sort, Quick sort, Merge sort, Heap sort comparison of sorting methods.

UNIT V

Trees- Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT, representations, recursive and non recursive traversals Search trees- Binary search tree- Binary search tree ADT, insertion, deletion and searching operations, Balanced search trees, AVL trees- Red Black trees .

Graphs- Graphs terminology, Graph ADT, representations, graph traversals/search methods- dfs and bfs,

Course Outcomes:

At the end of the course, students will be able to:

1. Apply the Object Oriented Programming Principles for problem solving.
2. Apply the Basic and advanced Data structures and their Implementations for real world applications.
3. Design algorithms and apply appropriate advanced data structures for solving computing problems efficiently.
4. Use the Searching and Sorting Techniques for real world applications.
5. Analyze and apply the suitable data structure for the given real world problem.

Text Books:

1. Data Structures and Algorithms using C++, Ananda Rao Akepogu and Radhoka Raju Palagiri, Pearson Education.
2. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.

Reference Books:

1. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.
2. Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
3. Data Structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson.
4. Data Structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
5. Problem Solving with C++, The OOP, Fourth Edition , W. Savitch, Pearson education.
6. Data Structures using C++, D.S. Malik, Cengage Learning. India Edition.

M. Tech. I Year I Semester

16CSE103 COMPUTER SYSTEM DESIGN

L	T	P	C
4	0	0	4

Course Description:

This course covers computer functional units and their responsibility with the architectural details. It also covers the computer's control unit working and operational system concepts and security.

Course Objectives:

- To interpret the design of the various functional units of digital computers.
- To understand the basic processing unit and how they are connected and how it generates control signals (using hardwired and micro programmed approaches).
- To be familiar with multithreading and the concepts of memory management including virtual memory.
- To understand the issues related to file system interface and implementation, disk management with protection and security mechanisms.

UNIT I: BASIC STRUCTURE OF COMPUTER

Computer types, functional units, Basic Operational units, Bus Structure, software, performance, Multiprocessors and Multicomputers, Von-neumann architecture, Number System, Memory Operations

UNIT II: COMPUTER ARCHITECTURE

IA -32 Pentium- registers and addressing, input/output organization, interrupts, interrupt handlers, DMA, Buses, Interface circuits, I/O interfaces, Memory performance considerations

UNIT III: CONTROL & PROCESSING UNIT

Execution of a complete instruction, multiple bus organization, hardwired control, micro programmed control, Pipelining: data hazards, instruction hazards, influence on instruction sets, data path and control consideration, and introduction to RISC & CISC architectures, embedded systems and examples

UNIT IV: PROCESSES AND THREADS

Processes- components, states, scheduling, threads- types of threads, multi threading models, inter process communication, classical IPC problems, Deadlocks-necessary conditions, handling mechanisms

UNIT V: FILE SYSTEM AND SECURITY

Files structure, types, access mechanisms, space allocation, UNIX file system, program threats, intruders, accident data loss, basics of cryptography, user authentication.

Course Outcomes:

At the end of the course, students will be able to:

1. Learn about computer performance, computer design, and trade-offs between cost and performance as well as between hardware and software.
2. Analyze the performance requirements of system to formulate and solve
3. Infer the need and requirement of an interface with machine.
4. Apply the features of operating systems to solve memory & process management issues.
5. Interpret the concepts of programming constructs of modern operating systems

Text Books:

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition,McGraw Hill.(UNIT I,II,III)

2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI(UNIT IV,V)

Reference Books:

1. Computer Organization and Architecture – William Stallings Sixth Edition, pearson/PHI.

2. Morris Mano -Computer System Architecture –3rd Edition-Pearson Education.

3. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7thEdition, John Wiley.

4. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI.

M. Tech. I Year I Semester

16CSE104 ADVANCED COMPUTER NETWORKS

L	T	P	C
4	0	0	4

Course Description:
This course mainly focuses on advanced concepts of computer networks such as wireless sensor networks, optical networks and mobile IPs. It presents the fundamental concepts of computer networks and networking devices with the in detail knowledge of reference models. This course also encompasses the structures and functions of various computer networking protocols.

Course Objectives:

- To make the students recall the basics of computer networks and to discuss different computer networking protocols.
- To refresh the knowledge of networking devices and learn data link layer and LAN protocols in detail.
- To make the students learn the core concepts of cellular wireless networks.
- To introduce the concepts of optical networks and optical network protocols.
- To make the students learn wireless sensor networks and associated protocols

UNIT I: REVIEW OF COMPUTER NETWORKS AND NETWORKING DEVICES
History of Computer Networks and Internet, The Network edge and core, Access Networks and Physical media, Delay and Loss in Networks **Reference Layers:** 5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing **Networking Devices:** Multiplexers, Modems, Switches and Routers

UNIT II: INTERNETWORKING AND ROUTING
Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 Network–Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intra and Inter domain Routing Protocols, Congestion Control at Network Layer **Multicasting Protocols:** Basic Definitions and Techniques, Intra and Inter domain Multicast Protocols

UNIT III: TRANSPORT AND APPLICATION LAYER PROTOCOLS
Transport Layer Services, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), TCP Congestion Control **Application Layer:** Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Socket Programming with TCP and UDP, Building a Simple Web Server.

UNIT IV: WIRELESS NETWORKS AND MOBILE IP
Infrastructure of Wireless Networks, Wireless LAN Technologies, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) **Optical Networks:** Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Case Study: An All-Optical Switch.

UNIT V: VPNS, OVERLAY NETWORKS

Virtual Private Networks (VPNs), Overlay Networks – **VoIP and Multimedia Networking:** Overview of IP Telephony, VoIP Signalling Protocols, Real-Time Media Transport Protocols **Mobile Ad-Hoc Networks:** Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks **Wireless Sensor Networks:** Sensor Networks and Protocol Structures, Clustering Protocols, Routing Protocols.

Course Outcomes:

At the end of the course, students will be able to:

1. Refresh their knowledge in basics of computer networks and TCP/IP and OSI reference models.
2. Learn about data link layer, routing, internetworking, multicasting protocols, transport and application layers.
3. Interpret channel assignments, handoffs, allocation, channel interference and power control.
4. Design optical mesh networks and understand the concepts of optical switches
5. Learn Wireless Sensor Networks (WSN) concepts, and multimedia networking

Text Books:

1. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W.Ross, Third Edition, Pearson Education, 2007. (UNITS-I, II, III).
2. Computer and Communication Networks, Nader F. Mir, Pearson Education, 2007. (UNIT-IV, V).

Reference Books:

1. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McgrHill,2007.
2. Guide to Networking Essentials, Greg Tomsho,Ed Tittel, David Johnson,Fifth Edition, Thomson.
3. An Engineering approach to computer Networking, K. Keshav, Pearson Education.
4. Campus Network Design Fundamentals, Diane Teare, Catherine paquet, Pearson Education (CISCO Press).

M. Tech. I Year I Semester

16CSE105 OBJECT ORIENTED ANALYSIS & DESIGN PATTERNS

L	T	P	C
4	0	0	4

Course Description:

The course covers object-oriented analysis and design using Unified Modeling Language (UML). This course provides the importance of modeling mechanisms, object-oriented concepts. Design patterns and their importance are discussed with the case study.

Course Objectives:

1. To get clear idea on the fundamentals of UML, principles of modeling.
2. To develop applications using UML.
3. To learn and understand the concepts of design patterns and to design a document editor.

UNIT I: INTRODUCTION TO UML AND MODELING

Introduction to UML: The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, generosity, importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture.

UNIT II: BASIC STRUCTURAL MODELING

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT III: BEHAVIORAL MODELING

Interaction Diagrams, Common Modeling Techniques, Basic Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams. Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT IV: INTRODUCTION TO DESIGN PATTERNS

Introduction to Design Patterns-Design Pattern Definition, Design Patterns in Small Talk MVC, Describing Design Patterns, Catalog of Design Patterns, Organizing the Catalog, Solving of Design Problems using Design Patterns, Selection of a Design Pattern, and use of Design Patterns.

UNIT V: CASE STUDY

Designing A Document Editor: A Case Study -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.

Course Outcomes:

At the end of the course, students will be able to:

1. Understand the importance of modeling and conceptual model of UML.
2. Apply structural modeling mechanisms in developing an application.
3. Apply behavioral and architectural modeling in developing an application.
4. Analyze the design patterns.
5. Create a document editor.

Text Books:

1. The Unified Modeling Language User Guide By Grady Booch, James Rumbaugh, Ivar Jacobson 2nd Edition, Pearson Education.
2. Gamma, Belm, Johnson, "Design Patterns: Elements of Reusable Object Oriented Software", 1995, PEA

Reference Books:

1. Fundamentals of Object Oriented Design in UML By Meilir Page-Jones, Pearson Education.
2. Object Oriented Analysis & Design By AtulKahate, The McGraw-Hill.
3. Michael Blaha and James Rumbaugh, "Object-oriented modeling and design with UML", Prentice-Hall of India, 2005.

M. Tech. I Year I Semester – Elective - I

16CSE401 SOFTWARE ENGINEERING

L	T	P	C
4	0	0	4

Course Description:
This course covers various software process models, user interface design concepts and software modeling. It also covers object oriented concepts, product metrics and pattern based design methods of software engineering process.

Course Objectives:
- To understand variety of software process models.
- To learn the concepts of software requirements and modeling.
- To interpret software architecture and user interface design concepts.
- To apply pattern based design methods and software testing models for system design
- To understand the concepts of testing object oriented applications, software product matrices and software reengineering process.

UNIT I: SOFTWARE, SOFTWARE ENGINEERING AND PROCESS
The nature of Software, The unique nature of WebApps, Software engineering- A layered technology, The essence and principles of software engineering practice, Generic process model (framework), Process patterns, Process assessment and improvement, CMMI, Software myths. Process Models: Prescriptive process models: The waterfall model, Incremental process models, Evolutionary process models. The Unified process, Aspect oriented software development, Agile development: Agile process, Extreme programming.

UNIT II: SOFTWARE REQUIREMENTS
Introduction to functional and non-functional requirements, Requirements engineering activities, Eliciting requirements, Requirements modeling, Requirements validation, Software requirements specification (SRS), Requirements management. Requirements modeling: Structured view: Data modeling (ERD), Functional modeling (DFD), Behavioral modeling. Object oriented view: Use cases, CRC Modeling, Analysis classes, Collaborations, Responsibilities, Object relationship model, Object behavior model. Software Project Estimation: Empirical estimation models.

UNIT III: DESIGN CONCEPTS
Software design quality guidelines and attributes, Design concepts. Software Architecture: Architecture and its importance, Architectural Styles, Data design, Architectural design. Design : Structured view (Traditional view): Architectural mapping using data flow (Call and return architecture), Interface design, Function based component design. Object oriented view: OO Architecture, Class hierarchies, Message design, Class based component design. Performing User Interface Design: Golden rules, User interface analysis and design, interface analysis, interface design steps.

UNIT IV: PATTERN BASED DESIGN AND SOFTWARE TESTING
Design patterns, Pattern based software design, Architectural patterns, Component level design patterns, User interface design patterns. Testing : Software testing strategies: A strategic approach to software testing, Test strategies (Unit testing and integration testing) for

conventional and object oriented software, Validation testing, System testing, The art of debugging. Testing Conventional Applications: Software testing fundamentals, White-Box testing: basis path testing, condition (predicate) testing, data flow testing, loop testing, Black box testing: Equivalence partitioning, Boundary value analysis, Graph based testing methods.

UNIT V: TESTING OBJECT ORIENTED APPLICATIONS

OO testing methods, Testing methods applicable at class level, Interclass test case design. Umbrella Activities: Risk management, Software quality assurance, Software configuration management, Measurement and metrics: Size oriented metrics, Function oriented metrics, Metrics for software quality, Product metrics: Metrics for the requirements model, Metrics for the design model, Metrics for source code, Metrics for testing, Metrics for maintenance. Software Reengineering: A software reengineering process model, Software reengineering activities.

Course Outcomes:

At the end of the course, students will be able to:

1. Understand the principles of software engineering and process models.
2. Interpret software requirements and design requirements model.
3. Design Software Architecture.
4. Apply software design patterns, interface design patterns and use testing strategies
5. Apply object oriented testing methods and software reengineering activities.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 7th edition. McGraw-Hill International Edition.
2. Software Engineering- Sommerville , 7th edition, Pearson education.

REFERENCE BOOKS:

1. Software Engineering- K.K. Agarwal &YogeshSingh,New Age International Publishers.
2. Software Engineering, an Engineering approach- James F. Peters, WitoldPedrycz, John Wiely.
3. Systems Analysis and Design- Shely Cashman Rosenblatt,Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw- Hill Companies.

M. Tech. I Year I Semester – Elective - I

	L	T	P	C
16CSE402 ARTIFICIAL INTELLIGENCE	**4**	**0**	**0**	**4**

Course Description:

This course is aimed to provide basic understanding of different intelligent agents in terms of Artificial Intelligence. This Course covers introduction to Artificial Intelligence, solving problems by various algorithms, Knowledge and Reasoning, Learning from Observations, and Neural networks.

Course Objectives:

- To make the students understand the fundamentals of AI and Intelligent Agents
- To make the students familiarize with AI Problem-Solving techniques
- To make the students understand knowledge representation and reasoning
- To make the students understand various learning methods

UNIT I: INTRODUCTION TO AI AND INTELLIGENT AGENTS

What is AI? The Foundations of Artificial Intelligence, The State of the Art, Agents and Environments, The Concept of Rationality, The Nature of Environments, The Structure of Agents

UNIT II: PROBLEM-SOLVING

Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions, Local Search Algorithms and Optimization Problems, Adversarial Search, The minimax algorithm, Alpha-Beta Pruning, Constraint Satisfaction Problems

UNIT III: KNOWLEDGE REPRESENTATION & REASONING

Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

UNIT IV: LEARNING-I

Learning from Examples, Forms of Learning, Learning Decision Trees, Regression and Classification with Linear Models, Artificial Neural Networks, Nearest neighbor models.

UNIT V: LEARNING-II

Learning Probabilistic Models, Statistical Learning, Learning with Complete Data, Learning with Hidden Variables: The EM Algorithm, Reinforcement Learning, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning.

Course Outcomes:

At the end of the course, students will be able to:

1. Understand different types of AI agents
2. Choose and apply appropriate AI search algorithms
3. Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information
4. Apply knowledge representation, reasoning, and machine learning techniques to real-world problems

Text Books:

S. Russell and P. Norvig, "Artificial Intelligence – A Modern Approach", Third Edition, Pearson Education, 2009

Reference Books:

1. E Rich, K Knight and Shivashankar B Nair, "Artificial Intelligence", Third Edition, Tata McGraw Hill, 2009
2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press, 2004.
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
4. Nils. J Nilsson, "Artificial Intelligence: A new Synthesis", Morgan Kauffmann Publishers.

M. Tech. I Year I Semester – Elective - I

	L	T	P	C
16CSE403 GRID COMPUTING	**4**	**0**	**0**	**4**

Course Description:

The course will provide an in-depth introduction to Grid technologies and its infrastructure. Web services and related technologies will be discussed. The technologies and software in the area of grid computing are undergoing enormous changes. This course will make students to learn the Grid services and its Toolkits.

Course Objectives:

- To make Students will learn about Grid Computing and its technologies.
- To make Students to implement web service and its related technologies.
- To make Students to understand the Grid Infrastructure and to use toolkits.

UNIT I: INTRODUCTION AND OVERVIEW OF GRID COMPUTING

Early Grid Activities, Current Grid Activities-An Overview of Grid Business Areas-Grid Applications, Grid Infrastructure.

UNIT II: WEB SERVICES AND RELATED TECHNOLOGIES

Service – Oriented Architecture, Web Service Architecture-XML, Related Technologies, and Their Relevance to Web services, XML Messages and Enveloping-Service Message Description Mechanisms, Relationship between Web Service and Grid Service, Web Service Interoperability and the Role of the WS-I Organization.

UNIT III: DISTRIBUTED OBJECT TECHNOLOGY FOR GRID COMPUTING (OGSA)

Introduction to Open Grid Services Architecture (OGSA), Commercial Data Center, National Fusion Collaboratory, The OGSA Platform Components.

UNIT IV: OPEN GRID SERVICES INFRASTRUCTURE (OGSI)

Introduction-Grid Services-A High-Level Introduction to OGSI, Introduction to Service Data Concepts, Grid Service: Naming and Change Management Recommendations.

UNIT V: OGSA BASIC SERVICES AND THE GRID COMPUTING TOOLKITS

Common Management Model (CMM), Security Architecture, GLOBUS GT3 Toolkit: Architecture- GLOBUS GT3 Toolkit: - Architecture, Programming model, High level services.

Course Outcomes:

At the end of the course, students will be able to:

1. Understand Grid Infrastructure and its applications.
2. Use XML and Grid related technologies.
3. Analyze OGSA Platform components.
4. Understand OGSI and Grid services.
5. Use Grid Computing toolkits.

Text Books:

Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson/PHI PTR-2003. Reference Books.

Reference Books:

1. Ahmar Abbas, "Grid Computing: A Practical Guide to technology and Applications", Charles River media – 2003.
2. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, Grid Computing: Making The Global Infrastructure a Reality, Wiley, 2003.
3. Maozhen Li, Mark Baker, The Grid: Core Technologies, Wiley, 2005.

M. Tech. I Year I Semester

16CSE201 ADVANCED DATA STRUCTURES USING PYTHON PRACTICALS

L	T	P	C
0	0	3	2

Course Description:
This course will introduce the core data structures of the Python programming language. In this Course, Students are able to implement Data Structures using python Language.

Course Objectives:

- To develop skills to design and analyze the problems.
- To inculcate the programming skills of python language.
- To make the studentsto feel comfort with the object oriented programming.

LIST OF EXPERIMENTS:

1. Linked lists
2. Multistacks
3. Double Ended Queue (Deques) & Circular Queues
4. Min Heap
5. Deaps
6. Leftist Heap
7. AVL Tree
8. B:Tree
9. Quick Sort
10. Greedy algorithm
11. Knapsack using Dynamic Programming
12. Graph coloring using backtracking

Course Outcomes:
At the end of the course, students will be able to:

1. Students can learn python language constructs.
2. Students will learn OOP concepts which will be helpful for them in further semesters.
3. Students will have basic idea on data structures.

ReferenceBooks:

1. "Think Python" - How to Think Like a Computer Scientist, Version 2.0.13,June 2014.
2. "Data Structure and Algorithmic Thinking with Python", by NarasimhaKarumanchi.
3. "Problem Solving with Algorithms and Data Structures", by Brad Miller, David Ranum, Release 3.0.

M. Tech. I Year II Semester

L	T	P	C
4	0	0	4

16CSE106 BIG DATA ANALYTICS

Course Description:
This course teaches fundamental concepts and tools needed to understand the emerging role of Data analytics in Organizations.

Course Objectives:
1. This course brings together several key big data technologies used for storage, analysis and manipulation of data.
2. To recognize the key concepts of Hadoop framework, MapReduce, Pig, Hive.
3. To prepare a sample project in Hadoop API.

UNIT I: INTRODUCTION TO BIG DATA
Introduction to Big Data. What is Big Data? Why Big Data is Important. Meet Hadoop. Data. Data Storage and Analysis. Comparison with other systems. A brief history of Hadoop. Apache hadoop and the Hadoop EcoSystem. Linux Refresher, VMWare Installation of Hadoop. The Design of HDFS. HDFS Concepts. Command Line Interface to HDFS. Hadoop File System.

UNIT II: HADOOP MAPREDUCE
A Weather Dataset, Analyzing the Data with Unix Tools, Analyzing the Data with Hadoop-Map and Reduce, Java MapReduce, Scaling Out, Combiner Functions, Hadoop Streaming.

UNIT III: INTRODUCTION OF DATA SCIENCE
Introduction of Data Science-Getting started with R- Exploratory Data Analysis- Review of probability and probability distributions-Supervised Learning, Unsupervised Learning.

UNIT IV: INTRODUCTION TO DATA ANALYSIS WITH SPARK
What Is Apache Spark, A Unified Stack, Programming with RDDs- RDD Basics, Creating RDDs, RDD Operations, Passing Functions to Spark, Common Transformations and Actions, Persistence (Caching). Machine Learning with MLlib- Machine Learning Basics.

UNIT V: PIG & HIVE
Installing and Running Pig, Comparison with Databases, Pig Latin, User Define Functions, Data Processing Operators, Installing and Running Hive, Hive QL, Tables, Querying Data, User-Defined Functions.

Course Outcomes:
At the end of the course, students will be able to:
1. Understand the Basic's in Big Data Technologies and its importance.
2. Analyze the Big Data set by using Map Reduce.
3. Understand the Basic Concepts in Data Science.
4. Understand the RDD's in Apache Spark.
5. Apply tools and techniques like Pig and Hive to analyze Big Data.

Text Books:

1. Tom White, “Hadoop: The Definitive Guide”, 3rd Edition, O’reilly, 2012.
2. Noreen Burlingame and Lars Nielsen, “A Simple Introduction To Data Science”, 2012.
3. Holden Karau “Learning Spark: Lightning-Fast Big Data Analysis”, O’reilly.

Reference Books:

1. Chuck Lam , “HADOOP IN ACTION”, 2nd Edition ,2016
2. VigneshPrajapati, “Big Data Analytics withR and Hadoop”, Published by Packt Publishing Ltd.,2013.
3. Michael Minelli,MicheleChambers,AmbigaDhiraj ,”BIG DATA,BIG ANALYTICS”, Published by John Wiley & Sons, Inc., Hoboken, New Jersey.2013

M. Tech. I Year II Semester

16CSE107 WEB TECHNOLOGIES

L	T	P	C
4	0	0	4

Course Description:

This course focuses on the phenomenon known as the World Wide Web (WWW or Web). Its focus is to present many of the core technologies that the Web is based upon. These core technologies include:

- HTML (Hypertext Markup Language) and CSS (Cascading Style Sheets)
- Client-side Programming Using JavaScript
- Server-side Programming Using Perl, CGI and Java
- Servlets and Java

Course Objectives:

1. To make the students better understanding of web concepts.
2. To learn Javascript, CSS, Perl and CGI.
3. To learn about Java Object Oriented Features.
4. To learn about Servelts and JSP.

UNIT I: HTML, JAVASCRIPT AND CSS

HTML – Basic HTML, Document body, Text, Lists, Images, Tables, Frames.

Introduction to javaScript, Comments, Variables, String manipulation, Mathematical functions, Statements, Operators, Arrays, Regular expressions, Exception handling, Cookies.

Cascading Style Sheets – Introduction, Using Styles, Defining your own styles, Properties and values in styles.

UNIT II: WEB HOSTING AND PERL

Putting your page on Web – How web hosting works, Doman names, Getting Web Space, Transferring Files.

Why Perl?, The basic Perl Program, Scalars, Arrays, Hashes, Control Structures, Processing text, Regular expressions, Using files, subroutines.

UNIT III: CGI SCRIPTING

What is CGI?, Developing CGI Applications, Processing CGI, Returning a basic HTML Page, Introduction to CGI.pm, CGI.pm methods, Creating HTML pages dynamically, Using CGI.pm, Adding Robustness.

UNIT IV: JAVA

Java Fundamentals Classes, Inheritance, Packages, Interfaces, Exceptions Handling, Multithreading, Applets, Swing.

UNIT V: SERVLETS AND JSP

Servlets - Introduction, Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading initialization parameters.

JSP - Introduction, The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC architecture.

Course Outcomes:

At the end of the course, students will be able to:

1. Create user friendly interface for static and dynamic web pages with help of HTML, Javascript and CSS.
2. Apply Perl and CGI syntaxes in real world applications.
3. Apply object oriented features to real world problems.
4. Implement programs using Servelts and JSP.

Text Books:

1. Chris Bates, "Web Programming: Building Internet Applications", 3rd Edition, John Wiley & Sons. (UNIT I, II, III)
2. Matthew MacDonald, "Creating a Web Site: The Missing Manual: The Missing Manual", O'Reilly Media, Inc. (Unit II)
3. Herbert Schildt, "Java The Complete Reference", 7th Edition, Tata McGraw-Hill Education. (UNIT IV, V)
4. Hans Bergsten, "JavaServer Pages", 3rd Edition, O'Reilly Media, Inc. (UNIT V)

Reference Books:

1. Robert W. Sebesta, "Programming With World Wide Web", 4th Edition, Pearson Education.
2. Subrahmanyam Allamaraju, Cedric Buest, "Professional Java Server Programming: J2EE 1.3 Edition", Apress, 2001.
3. Jason Hunter, William Crawford, "Java Servlet Programming", "O'Reilly Media, Inc.", 2001.
4. Jim Farley, William Crawford, David Flanagan, "Java Enterprise in a Nutshell: A Desktop Quick Reference", "O'Reilly Media, Inc.", 2002

M. Tech. I Year II Semester

16CSE108 MOBILE COMPUTING

L	T	P	C
4	0	0	4

Course Description:
This course introduces the basic concepts and principles of wireless and mobile communication. This covers discussions on wireless medium access control layer, Mobile network layer, mobile transport and application layer protocols. This also introduces selected topics on WWW support in mobile devices.

Course Objectives:
1. To impart fundamental concepts in the area of mobile computing.
2. To provide system perspective on the converging areas of wireless networking.
3. To give insights of the key components and protocols involved in Mobile network, layer, transport and application layers.
4. To explore the support of World Wide Web in mobile communication.

UNIT I: INTRODUCTION TO MOBILE COMMUNICATION AND COMPUTING
Emerging applications, A short history of wireless communication, A market for mobile communications. Wireless Transmission: Frequencies for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation (ASK, FSK, PSK), spread spectrum.

UNIT II: (WIRELESS) MEDIUM ACCESS CONTROL
Motivation for a specialized MAC (Hidden and exposed terminals, near and far terminals), SDMA, FDMA, TDMA, CDMA. GSM: Mobile services, System architecture, Radio Interface, Protocols, Localization and calling, Handover, Security, New data Services.

UNIT III: MOBILE NETWORK LAYER
Mobile IP - Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, tunneling and encapsulation, Dynamic Host Configuration Protocol (DHCP), Properties and Applications of a MANETs: Routing – DSDV, DSR.

UNIT IV: MOBILE TRANSPORT AND APPLICATION LAYER
Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/Fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction Oriented TCP.

UNIT V: SUPPORT FOR MOBILITY
World Wide Web; Wireless Application Protocol – Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language.

Course Outcomes:

At the end of the course, students will be able to:

1. Realize the basic concepts of mobile computing and wireless communication.
2. Describe the components and characteristics of Mobile IP for Mobility Management and illustrate traffic routing with mobile IP
3. Assess the various GSM mobile services
4. Explore the characteristics of Mobile transport and application layer protocols
5. Analyze the framework for wireless and mobile web access

Text Books:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley. (Chapters I,II,III,IV,V), Second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002.

Reference Books:

1. Theodore S. Rappaport, Wireless Communications Principles and Practice, Second Edition, Pearson Education, India.ISBN 978-81-317-3186-4, 2010.
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.
3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, second edition, 2003.

M. Tech. I Year II Semester

16CSE109 ADVANCE DATABASES

L	T	P	C
4	0	0	4

Course Description:
This course covers the core principles and techniques of data and information management. The potential topics covered include distributed DBMS, query processing, and parallel databases. This course also discusses trendy applications under the umbrella of database systems.

Course Objectives:
1. To understand conceptual modeling techniques, database design and implementation.
2. To get insights of DBMS system architecture and its design issues
3. To have knowledge on state of the art applications of distributed database systems.

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UNIT I: INTRODUCTION
Database system concepts and architecture, Data modeling using E-R model, Relational model, Relational algebra, ER to Relational model mapping, Schema Refinement, Functional Dependencies, Normal forms based on primary keys, Second and Third normal forms, Boyce-Codd normal form, properties of decompositions. Normalization, Schema refinement in database design, multivalued dependencies, fourth normal form, Join Dependencies, fifth normal form.

UNIT II: DISTRIBUTED DBMS
Introduction, Distributed DBMS architecture, DBMS standardization, Architecture models for distributed DBMSs, Distributed DBMS Architecture, Distributed database design, design strategies, design issues, fragmentation, allocation, semantic data control, view management, data security, semantic integrity control.

UNIT III - QUERY PROCESSING AND OPTIMIZATION
Query processing problem, objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data, query optimization, centralized query optimization, join ordering in fragment queries, distributed query optimization algorithms.

UNIT IV - PARALLEL DATABASE AND DISTRIBUTED OBJECT DATABASE SYSTEMS
Database servers, Parallel architectures, Parallel DBMS techniques, Parallel execution problems, Parallel execution for hierarchical architecture, Fundamental objet concepts and object models, Object distributed design, Architectural issues, Object management, Distributed object storage, Object query processing, Transaction management.

UNIT V: CURRENT ISSUES
Data warehousing–data mining, mobile database, multimedia database, geographic information systems, genome data management, Peer-to-Peer Data Management, Web Data Management-Streaming Data and Cloud Computing

Course Outcomes:

At the end of the course, students will be able to:

1. Construct the conceptual model and relational model for the given database application and Refine the schema using Functional dependencies and normal forms
2. Investigate the concepts in distributed database system design and maintenance of data integrity
3. Optimize the query processing by exploiting a large amount of useful information about the data
4. Exhibit the advantages and disadvantages of the various parallel database system architectures.
5. Apply the knowledge on state of the art applications which are based on database model

Text Books:

1. RamezElmasri&Shamkant B. Navethe, Fundamentals of Database Systems, fourth Edition, Pearson Education, 2004. (Unit I)
2. Tamer Ozsu. M., Patrick Valduriez, Principles of Distributed Database Systems, Third Edition, Springer, 2011. (Unit II, III, IV, & V)

Reference Books:

1. Abraham Silberchatz, Henry F. Korth, S.Sudarsan, Database System Concepts, Fifth Edition, McGraw-Hill, 2006. (Unit I)
2. Stefano Ceri, Giuseppe Pelagatti, Distributed Databases Principles and Systems, McGraw-Hill International Editions, 1985.
3. Rajesh Narang, Object Oriented Interfaces and Databases, Prentice Hall of India, 2002.

M. Tech. I Year II Semester

16CSE110 INFORMATION SECURITY AND CYBER FORENSICS

L	T	P	C
4	0	0	4

Course Description:
The course provides a comprehensive view of symmetric and asymmetric cryptographic schemes, the network security principles and measures to prevent vulnerabilities and security attacks in the networks, knowledge in the various functions of Operating Systems and methods to secure operating systems, Forensic Incident, duplication, file system, Network Forensics.

Course Objectives:
1. Understand the classic & public key cryptosystems, hash functions.
2. Learn and understand the next generation Internet protocol.
3. Acquire fundamental knowledge on the concepts of securing operating systems
4. Become knowledgeable in various methods and protocols to maintain E-mail security , and web security
5. Plan and prepare for all stages of a Cyber & Forensic Incidents and Network Forensics

UNIT - I: INTRODUCTION
Services, Mechanisms and attacks-the OSI security architecture-Network security model classical Encryption techniques, Data Encryption Standard-Block cipher principles, Advanced Encryption Standard (AES), Principles of public key cryptosystems-The RSA algorithm-Key management -Diffie Hellman Key exchange, Authentication functions-Message authentication codes-Hash functions-Hash Algorithms (Secure Hash Algorithm)

UNIT-II: NEXT GENERATION INTERNET PROTOCOL
Introduction to IPv6 – IPv6 Advanced Features –V4 and V6 header comparison – V6 Address types –Stateless auto configuration – IPv6 routing protocols – IPv4-V6 Tunneling and Translation Techniques.

UNIT-III: OPERATING SYSTEM SECURITY
Security in Windows and LINUX/Unix: Protection system, authorization, security analysis and vulnerabilities- The security kernel- Secure communications processor – Retrofitting security into operating systems

UNIT-IV: WEB SECURITY
SSL/TLS Basic Protocol Plan and prepare for all stages of a Forensic Incidents and Network Forensicsol-computing the keys- client authentication-PKI as deployed by SSL Attacks fixed in v3- Exportability-Encoding-Secure Electronic Transaction (SET), Kerberos, Security Services for E-mail-attacks possible through E-mail-Pretty Good Privacy-S/MIME.

UNIT-V: CYBER & FORENSICS

Cyber Security and its problem-Intervention Strategies: Redundancy, Diversity and Autarchy, Cyber security in Society, Security in cyber laws. Forensics Incident - Incident Response Methodology, Forensic duplication, Forensic Analysis of File Systems, Network Forensics: Network Protocols - Email Tracing - Internet Fraud, Ethical Issues - Cybercrime.

Course Outcomes:

At the end of the course, students will be able to:

1. Understand the classic & public key cryptosystems, hash functions.
2. Identify & compare the next generation Internet protocol.
3. Able to apply the security concepts on operating systems
4. Chose various methods and protocols to maintain E-mail security, and web security.
5. Illustrate for all the stages of Cyber & Forensic Incidents and Network Forensics

TEXT BOOKS-

1. William Stallings, "Cryptography and Network Security", Pearson Education, 6th Edition, 2013, ISBN 10: 0133354695
2. Kevin Mandia, Chris Prosise, "Incident Response and computer forensics", Tata McGraw-Hill, 2006

REFERENCE BOOKS:

1. Trent Jaeger, Operating Systems Security, Morgan & Claypool Publishers, 2008
2. Michael J.Palmer, Guide to Operating Systems Security, Thomson/Course Technology, 2004
3. Jonathan Rosenoer,"Cyber Law: The law of the Internet", Springer-Verlag, 1997

M.Tech. I Year II Semester – Elective II

16CSE404 CLOUD COMPUTING

L	T	P	C
4	0	0	4

Course Description:
Cloud computing is a key distributed systems paradigm that has grown popular in the last few years. Cloud technologies are pervasive, touching our daily lives any time we access the World Wide Web, use a mobile app, or make a retail purchase. Clouds are also the de facto infrastructure for "Big Data" applications.

Course Objectives:
1. To impart fundamental concepts in the area of cloud computing.
2. To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.
3. To enable students exploring some important cloud computing driven commercial systems such as GoogleApps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.

UNIT I: CLOUD COMPUTING BASICS
Cloud Computing Overview, Applications, Intranets and the Cloud, First Movers in the Cloud, Your Organization and Cloud Computing-When You Can Use Cloud Computing, Benefits, Limitations, Security Concerns, Regulatory Issues, Cloud Computing with the Titans, The Business Case for going to the Cloud-Cloud Computing Services, How Those Applications Help Your Business, Deleting Your Datacenter,Salesforce.com

UNIT II: CLOUD COMPUTING TECHNOLOGY
Hardware and Infrastructure, Accessing the Cloud, Cloud Storage, Standards.

UNIT III: CLOUD COMPUTING AT WORK
Software as a Service, Driving Forces, Company Offerings, Industries.Software plus Services.

UNIT IV: DEVELOPING APPLICATIONS
Developing Applications-Google, Microsoft, Intuit QuickBase, Cast Iron Cloud, Bungee Connect, Development, Troubleshooting, Application Management. Local Clouds and Thin Clients- Virtualization in Your Organization, Server Solutions, Thin Clients.

UNIT V: MIGRATING TO THE CLOUD
Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, Migration.Best Practices and the Future of Cloud Computing-Analyze Your Service.

Course Outcomes:

At the end of the course, students will be able to:

1. Understand the systems, protocols and mechanisms to support cloud computing.
2. Understand the hardware and Infrastructure necessary for cloud computing
3. Understand the importance of software as a Service in Cloud Computing.
4. Design and implement a novel cloud computing application.
5. Understand the Migrations of the Cloud Computing.

Text Books:

1. "Cloud Computing, A Practical Approach", by Toby Velte , Anthony Velte , Robert C. Elsenpeter, Published by The McGraw-Hill.
2. "Cloud Computing: From Beginning to End" , by Mr. Ray J Rafaels.

Reference Books:

1. Cloud Computing: Concepts, Technology & Architecture, 1st Edition , by Thomas Erl, Ricardo Puttini , Zaigham Mahmood.
2. Amazon Web Services For Dummies,1st Edition , by Bernard Golden.
3. Handbook of Cloud Computing, by Borko Furht ,Armando Escalante, Published by Springer .

M. Tech. I Year II Semester

16CSE405 RESEARCH METHODOLOGIES IN COMPUTER SCIENCE

L	T	P	C
4	0	0	4

Course Description:
This course introduces the students for doing research in general and for formulating research problems and thesis topics in particular. It covers the research methodologies, data collection and analysis, ethical and professional issues and oral and written communication skill.

Course Objectives:
1. Inspiring the students towards research activities
2. Encouragement of the students to deeply study research subjects and domains of their choice
3. Analyze the data using technical tools
4. Learning to write a research paper and thesis

UNIT I: RESEARCH APTITUDE
Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is done.

UNIT II: RESEARCH PROCESS
Reviewing the literature, Formulation of research problem, Nature and type of variables, Hypothesis - meaning, types, development of hypothesis and its testing, Meaning & Functions of Research Design

UNIT III: DATA ANALYSIS & RESEARCH METHODS
Sources, acquisition and interpretation of data, Quantitative and qualitative data, Graphical representation and mapping of data, Optimization with EXCEL Solver, Summarizing Data with Histograms and Descriptive Statistics. Research methods – Experimental method, Simulation method and Theoretical method.

UNIT IV: REPORT WRITING
Different Steps in writing Report, Layout of the Research Report, Types of Reports, Mechanics of Writing a Research Report, Art of scientific writing- Steps to better writing, flow method, organization of material and style, Drawing figures, graphs, tables, footnotes, references etc. in a research paper

UNIT V: USING INTERNET FOR RESEARCH
Use of internet networks in research activities in searching material, paper downloading, submission of papers, relevant websites for journals and related research work. Introduction to Patent laws etc., process of patenting a research finding, Copy right, Cyber laws.

Course Outcomes:

At the end of the course, students will be able to:

1. Recognize the main research methodologies used in computer science and choose the appropriate research methodology.
2. Perform an appropriate literature review.
3. Describe the most common data collection and analysis methods used in Computer Science research.
4. Communicate both orally and in writing as a manuscript and submission of manuscript through Internet by following the Cyber laws.
5. How to patent the research

References:

1. *Research Methodology Methods and Techniques*, Kothari, C. R., Wiley Eastern Ltd.
2. *Microsoft Excel Data Analysis and Business Modeling*, Wayne L. Winston, Microsoft Press, ISBN: 0735619018
3. *From Algorithms to Z-Scores: Probabilistic and Statistical Modeling in Computer Science,* Professor Norm Matloff , University of California, Davis, 2013.
4. *Research Methodology: a step-by-step guide for beginners*, Kumar, Pearson Education.
5. *Practical Research Methods*, Dawson, C., UBSPD Pvt. Ltd.
6. *Research Methodology*, Sharma, N. K., KSK Publishers, New Delhi.

M. Tech. I Year II Semester – Elective II

16CSE406 SOFTWARE QUALITY ASSURANCE AND TESTING

L	T	P	C
4	0	0	4

Course Description:
This course covers the software quality assurance frame work with different software quality metrics and methodologies. It also covers the concepts of optimistic testing techniques and a variety of testing tools.

Course Objectives:
1. To learn the concepts of software quality assurance framework
2. To understand the process of software testing throughout the software development process
3. To analyze software quality assurance metrics, difficulties and limitations
4. To interpret the knowledge of testing tools

UNIT I: SOFTWARE QUALITY ASSURANCE FRAMEWORK AND PLAN
Software Quality Assurance Framework and Standards SQA Framework: What is Quality? Software Quality Assurance, Components of Software Quality Assurance – Software Quality Assurance Plan: Steps to develop and implement a Software Quality Assurance Plan – Quality Standards: ISO 9000 and Companion ISO Standards

UNIT II: SOFTWARE QUALITY ASSURANCE METRICS AND MEASUREMENT SOFTWARE QUALITY METRICS
Product Quality metrics, In-Process Quality Metrics, Metrics for Software Maintenance, Examples of Metric Programs.

UNIT III: SOFTWARE QUALITY METRICS
Software Quality metrics methodology**:** Establish quality requirements, Identify Software quality metrics, Implement the software quality metrics, analyze software metrics results, validate the software quality metrics – Software quality indicators – Fundamentals in Measurement theory .

UNIT IV: SOFTWARE TESTING TECHNIQUES
Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing .

UNIT V: SOFTWARE TESTING TOOLS
Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Java Testing Tools, JMetra, JUNIT and Cactus.

Course Outcomes:

At the end of the course, students will be able to:

1. Understand the effective strategies, methods and technologies of software testing
2. Design test plan and test cases to perform automatic testing
3. Apply effective software testing techniques in software development
4. Report clear and correct software defectives
5. To select distinguished tool for software testing

Text Books:

1. Effective Methods for Software Testing, 2nd Edition, William E. Perry , Second Edition, Wiley India, 2006.
2. Software Quality, Mordechai Ben-Menachem/Garry S. Marliss, Thomson Learning publication,1997.

Reference books:

1. Testing and Quality Assurance for Component-based Software, by Gao, Tsao and Wu, Artech House Publishers
2. Software Testing Techniques, by Bories Beizer, Second Edition, Dreamtech Press
3. Handbook of Software Quality Assurance, by G. Gordon Schulmeyer, James I.McManus, Second Edition, International Thomson Computer Press
4. Metrics and Models for Software Quality Engineering, by Stephen H. Kan, by Pearson Education Publication.
5. Software Testing Tools, K.V.K.K. Prasad, Dream tech press, 2008.

M. Tech. I Year II Semester

16CSE202 DATA ANALYTICS AND WEB TECHNOLOGIES PRACTICALS

L	T	P	C
0	0	3	2

Course Description:

Big Data Analytics Practical's will make students work on Different Eco Systems in Hadoop and make students to analyze the different Data Sets. Web Technologies course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the following.

- HTML (Hypertext Markup Language) and CSS (Cascading Style Sheets)
- Client-side Programming Using JavaScript
- Server-side Programming Using Perl, CGI and Java
- Servlets and Java

Course Objectives:

1. Understand Hadoop HDFS Commands.
2. Learn Basic Map Reduce in Hadoop
3. Understand the Basics in R.
4. Learn Apache Spark.
5. Understand Pig and Hive concepts
6. To learn HTML, Javascript, CSS and Perl
7. To learn about Java, Servelts and JSP.

LIST OF EXPERIMENTS: DATA ANALYTICS

Week 1

Implement the following file management tasks in Hadoop:

1) Adding files and directories

2) Retrieving files

3) Deleting files

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

Week 2

Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

Week 3

Data Analysis using R

1) Verify an R installation

2) Work with R scripts and objects from the R console

3) Create visualizations from R

4) Create and access data within R data structures

Week 4

Data Analysis using Apache Spark Install and Run Spark then write Python scripts to Creating RDD's , group, join, project, and filter your data.

Week 5,6 PIG

Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

Week 7,8: HIVE

Install and Run Hive then use Hive to create, alter, and drop databases, tables, views,functions, and indexes

LIST OF EXPERIMENTS: WEB TECHNOLOGIES

Week 1

a) Creation of college website
b) Develop an Image gallery web page. Use Javascript & CSS

Week 2

a) Write a javascript program to validate user credentials through cookies.
b) Write perl programs for client side validation on registration page.

Week 3

Write a CGI script to validate user credentials through cookies.

Week 4

a) Develop an applet that displays a simple message.
b) Develop an applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named - Compute is clicked.

Week 5

a) Design a registration page with help of java swing.
b) Design and Develop a simple Calculator with the help of user defined packages.

Week 6

a) Write a java program to connect to a database server using JDBC and insert 10 students information of user choice in to student table.
b) Develop a Servlet to validate user name and password stored in database. Display authorized user if she/he is authorized else display unauthorized user.

Week 7

Write JSP Program to store student information sent from registration page into database table.

Week 8

Develop a program to validate username and password that are stored in Database table using JSP.

Course Outcomes:

At the end of the course, students will be able to

1. Apply HDFC Commands.
2. Apply Map Reduce algorithms for various problems.
3. Design a program that uses Map Reduce to apply on structured data.
4. Design static and dynamic web pages with help of HTML, Javascript and CSS.
5. Apply Perl and CGI syntaxes in real world applications.
6. Create Java, Servlet and JSP programs that solve simple business problems.

Reference Books:

1. Chris Bates, "Web Programming: Building Internet Applications", 3rd Edition, John Wiley & Sons.
2. Herbert Schildt, "Java The Complete Reference", 7th Edition, Tata McGraw-Hill Education.
3. Hans Bergsten, "JavaServer Pages", 3rd Edition, O'Reilly Media, Inc.
4. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.
5. Holden Karau, "Learning Spark: Lightning-Fast Big Data Analysis", O'reilly