SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

Sree Sainath Nagar, Tirupati

Department of Computer Science and Engineering

Courses having focus on

Employability/ Entrepreneurship/ skill Development

Program: M.Tech.- Computer Science

Regulations : SVEC-14

The Courses (with course outcomes) under SVEC-14 Regulations which focus on *employability/ entrepreneurship/ skill development* are highlighted with the following colours.

Skill

Employability

Entrepreneurship

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)

M. Tech. (CS)-I Semester
(14MT10501) ADVANCED COMPUTER NETWORKS

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	--	--	4

PREREQUISITE: *A Course on* "Computer Networks"

COURSE DESCRIPTION:

Computer networks and protocols; Data Link Layer, LAN and Network routing; Transport Layer and internet protocols; Wireless and Optical Networks; MANETS and wireless Sensor Networks.

COURSE OUTCOMES:
On successful completion of this course the students will be able to :

CO1. Gain knowledge on principles of computers, network topologies, routing mechanisms.
CO2. Analyze the computer network with suitable network protocols and routing algorithms.
CO3. Apply algorithms for a given network to calculate least-cost and non-least cost paths.

UNIT - I: REVIEW OF COMPUTER NETWORKS AND FOUNDATION OF NETWORKING PROTOCOLS **(Periods:11)**
Review of Computer Networks and the Internet-The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet, packet-Switched Networks.
Foundations of Networking Protocols-5_layer TCP/IP Model, 7_Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM.
UNIT - II: DATA LINKS, TRANSMISSION AND ROUTING **(Periods:12)**
The Link Layer and Local Area Networks-Link Layer Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access Protocols, Link Layer Addressing, Link Virtualization.
Routing and Internet Working-Network Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols

UNIT - III: TRANSPORT LAYER PROTOCOLS AND NETWORK APPLICATIONS **(Periods:12)**
Internet Protocol-Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6
Transport and End-to-End Protocols-Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), TCP Congestion Control.

UNIT - IV: WIRELESS NETWORKS AND OPTICAL NETWORKS
(Periods:11)

Wireless Networks and Mobile IP-Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standards, Mobile IP, Wireless Mesh Networks (WMNs).

Optical Networks and WDM Systems-Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers

UNIT - V: MANETS AND WIRELESS SENSOR NETWORKS   (Periods:12)

VPNs, Tunneling and Overlay Networks-Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks.

Mobile Ad-Hoc Networks Overview of Wireless Ad–Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks- DSDV, DSR, AODV

Wireless Sensor Networks-Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

Total Periods:58

TEXT BOOKS:

1. Nader F. Mir, *"Computer and Communication Networks,"* Pearson Education, 2007.
2. F. Kurose, Keith W.Ross, *"Computer Networking: A Top-Down Approach Featuring the Internet,"* Pearson Education, Third Edition, 2007.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, *"Data Communications and Networking,"* Tata McGraw Hill, Fourth Edition, 2007
2. Andrew S. Tanenbaum, *"Computer Networks,"* Fourth Edition, Pearson Education, New Delhi, 1997
3. S. Keshav, *"An Engineering Approach to Computer Networking*," Pearson Education, New Delhi, 2004.

M.Tech (CS) I-Semester
(14MT10502) ADVANCED DATABASE MANAGEMENT SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITE: *A course on* "Database Management Systems"

COURSE DESCRIPTION:
Database Languages and architecture; Concepts of database design and modeling; SQL and Object relational databases; database design and file organizations; Query and transaction processing, concurrency; Distributed databases

COURSE OUTCOMES:
On successful completion of this course the students will be able to :

CO1. Gain knowledge about the
- Characteristics of Databases
- Architecture and applications of Databases

CO2. Analyse the need for database systems for storing the data.

CO3. Design and model an effective and sustainable database for better performance using database management system tools.

CO4. Apply concepts of normalization for designing complex databases for enhanced performance.

UNIT-I: DATABASE LANGUAGES AND ARCHITECTURE, RELATIONAL MODEL, CONCEPTUAL DATA MODELING   (Periods:11)
Introduction to Databases – Overview of Database Languages and Architecture – The Basic Relational Model
Conceptual Data Modeling Using Entities and Relationships: Using High-Level Conceptual data Model for Database Design, A Sample Database Application, Entity Types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types, Refining the ER Design for the COMPANY Database, ER Diagrams, Naming Conventions, and Design Issues, Relationship Types of Degree Higher than Two.

UNIT-II: SQL, OBJECT RELATIONAL DATABASE AND XML   (Periods:11)
Mapping a Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational Mapping, SQL**:** Data Definition, Constraints, Basic Queries and Updates, Advanced Queries, Assertions, Triggers, and Views.
Object and Object-Relational Databases: Concepts, Models, Languages and Standards, **XML:** Concepts, Languages, and Standards.

UNIT-III: DATABASE DESIGN AND FILE ORGANIZATIONS (Periods:11)
Database Design Theory: Introduction to Normalization Using Functional and Multivalued Dependencies, Normalization Algorithms.
Database File Organizations: Unordered, Ordered, and Hashed Files of Records: Introduction, Secondary Storage Devices, Buffering of Blocks, Placing File Records on Disk, Operations on Files, Files of Unordered Records,

Files of Ordered Records, Hashing Techniques, Other Primary File Organizations, Parallelizing Disk Access Using RAID Technology, New Storage Systems.

UNIT-IV: QUERY AND TRANSACTION PROCESSING, CONCURRENCY AND RECOVERY   (Periods:11)

Introduction to Query Processing and Query Optimization Techniques, Introduction to Database Tuning and Physical Design Issues, Foundations of Database Transaction Processing, Introduction to Protocols for Concurrency Control in Databases, Introduction to Database Recovery Protocols

UNIT-V: DISTRIBUTED DATABASES   (Periods:12)

Concepts, Types of Distributed Database Systems, Distributed Database Architectures, Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design, Query Processing and Optimization, Overview of Transaction Management, Overview of Concurrency Control and Recovery, Distributed catalogue management, Current Trends, Distributed Databases in Oracle Emerging Database Technologies and Applications.

Total Periods: 56

TEXTBOOKS:

1. Ramez Elmasri & Shamkant B. Navathe, *"Database Systems: Models, Languages, Design and Application Programming,"* Sixth Edition, New Delhi, Pearson Education, 2013.
2. M. Tamer Ozsu, Patrick Valduriez, *"Principles of Distributed Database System,"* Second Edition, New Delhi, Pearson Education, 2006.

REFERENCE BOOKS:

1. Thomas M. Connolly, Carolyn E. Begg, "Database Systems – A Practical Approach to Design, Implementation and Management," Third Edition, New Delhi, Pearson Education, 2003.
2. Stefano Ceri, Giuseppe Pelagatti, "Distributed Databases Principles and Systems," N.Y, McGraw-Hill International Editions, 1985.
3. Rajesh Narang, "Object Oriented Interfaces and Databases," New Delhi, Prentice Hall of India, 2002.
4. Abraham Silberchatz, Henry F. Korth, S. Sudarsan, "Database System Concepts," Fifth Edition, N.Y, McGraw-Hill, 2006.

M. Tech. (CS)-I Semester
(14MT10503) ADVANCED SOFTWARE ENGINEERING

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	--	--	4

PREREQUISITE: *A course on "Software Engineering".*

COURSE DESCRIPTION:
Software Engineering and process models; Software requirements and modeling; Design engineering; Software testing and Metrics; Software quality, maintenance and reengineering

COURSE OUTCOMES:
On successful completion of this course the students will be able to :

CO1. Gain knowledge in the concepts of
- Software engineering requirements modeling.
- System Modeling.
- Pattern based design.
- Software Metrics and Maintenance.

CO2. Identify assumptions and underlying relationships to formulate an appropriate problem solving strategy.
CO3. Apply analytical and problem-solving skills to design a complex software system.
CO4. Work independently and in teams to analyze the project requirements and create a design that satisfies these requirements.

UNIT-I: INTRODUCTION TO SOFTWARE ENGINEERING AND PROCESS MODELS **(Periods:12)**
Role of Software, Changing Nature of Software, legacy software, Software myths, Software Engineering- A Layered Technology, The principles of software engineering practice, Generic process (framework), **Process patterns-** Process assessment, Personal and Team process models, CMMI.
Process models- The waterfall model, Incremental process models, Evolutionary process models, The Rational unified process, agile process.
UNIT-II: SOFTWARE REQUIREMENTS AND MODELLING **(Periods:11)**
Functional and Nonfunctional requirements, Requirements Specification, Requirements Elicitation and Analysis, Requirements Validation and Management, Software requirements document (SRD), Requirements engineering process.
Requirements Modeling-Data modeling concepts, Scenario based modeling; Class based modeling, Creating a behavioral modeling.
UNIT-III: DESIGN ENGINEERING **(Periods:12)**
Design Quality Guidelines and attributes, Design Concepts, Design Model, Architectural Design- Architectural Views, Architectural Styles and Patterns**.**

Pattern based design- Architectural patterns, Component level design patterns, User interface design patterns.

System Modeling- Context Models, Interaction Models, Structural Models, Behavioral Models.

UNIT-IV: SOFTWARE TESTING AND METRICS **(Periods:13)**

Basic Concepts in Testing, System and Software Test and Integration, Module level testing, Module Test Planning, Static Testing, White box and Black Box Testing.

Management and Metrics: The Management Spectrum, W5HH Principle. Size oriented metrics, Function oriented metrics, Product metrics, Metrics for Analysis model, Metrics for the design model, Metrics for source code, Metrics for testing ,Risk Management.

UNIT-V: SOFTWARE QUALITY AND MAINTENANCE **(Periods:11)**

Software Quality, Software Standards, Reviews and Inspections S**oftware Reuse-** Reuse landscape, Application Frameworks, Software Product lines, COTS Product Reuse, **Software Maintenance-**Software Maintenance Process, Maintenance Resource Estimation.

Software Reengineering: A Software Reengineering process model, Reverse engineering, Restructuring.

Total Periods: 59

TEXT BOOKS:

1. Roger S. Pressman, *"Software Engineering-A Practioner's Approach,"* McGraw-Hill Higher Education, Sixth Edition, 2010.
2. Ian Sommerville, *"Software Engineering,"* Addison-Wesley, Ninth Edition, 2010.

REFERENCE BOOKS:

1. Ali Behforooz and Frederick J Hudson, *"Software Engineering Fundamentals,"* Oxford University Press, USA 1996.
2. Waman S Jawadekar, *"Software Engineering principles and practice,"* TATA McGraw- Hill, First Edition, 2004.
3. K.K. Agarwal and Yogesh Singh, *"Software Engineering,"* New Age International Publishers, Third Edition, 2008

M. Tech (Computer Science) I-Semester
(14MT10504) DATA STRUCTURES AND ALGORITHMS

Int. Marks 40	Ext. Marks 60	Total Marks 100		L 4	T --	P --	C 4

PREREQUISITE: *A course on "C programming".*

COURSE DESCRIPTION:

Linear data structures - arrays, stacks, queues and lists; Non-linear data structures - trees and graphs, Binary Search trees; Algorithm design techniques- divide and conquer, Greedy method; Dynamic Programming

COURSE OUTCOMES:
On successful completion of this course the students will be able to :

CO1. Gain advanced knowledge in
- Data structures like binary search trees, linked list, B-Trees, Hashing.
- Algorithm design methods like Divide and Conquer Approach, Greedy Approach, Branch and Bound, Dynamic Programming and Backtracking.

CO2. Analyze time complexities of all types of algorithms including recursive algorithms.

CO3. To design new data structures and algorithms

UNIT-I: BASIC DATA STRUCTURES (Periods:12)
Review of Arrays, Stacks, Queues, Circular Queues, Singly Linked Lists, Doubly Linked Lists Circular Linked Lists, Terminologies and Applications.
Algorithm Analysis :Efficiency of algorithms, Apriori Analysis, Asymptotic Notations, Polynomial Vs Exponential Algorithms, Average, Best, and Worst Case Complexities, Analyzing Recursive Programs.

UNIT-II: SEARCHING, SORTING, TREES AND GRAPHS (Periods:13)
SEARCHING AND SORTING: Linear Search, Binary Search, Fibonacci Search, Bubble Sort, Insertion sort, Selection Sort, Radix Sort.
Introduction, Definition and Basic terminologies of trees and binary trees, Representation of trees and Binary trees, Binary tree Traversals, Threaded binary trees, Graphs-basic concepts, representation and applications , DFS and BFS Traversals.

UNIT-III: BINARY SEARCH TREES, AVL TREES, B- TREES, HASH TABLES
INTRODUCTION, BINARY SEARCH TREES: (Periods:12)
Definition, Operations and applications. **AVL Trees**: Definition, Operations and applications. **B-Trees**: Definition, Operations and applications **Hash Tables**: Introduction, Hash Tables, Hash Functions and its applications.

UNIT-IV: DIVIDE – AND – CONQUER & GREEDY METHOD (Periods:10)
DIVIDE-AND – CONQUER: General Method, Binary Search, Finding Maximum and Minimum, Quick Sort, Merge sort, Polyphase Merge Sort, Cascade Merge

Sort, Strassen's Matrix Multiplication, **Greedy Method -** General Method, Minimum Cost Spanning Trees, and Single Source Shortest Path.

UNIT-V: DYNAMIC PROGRAMMING, BACK TRACKING & BRANCH-AND-BOUND DYNAMIC PROGRAMMING **(Periods:12)**
General Method, All Pairs Shortest Path, Single Source Shortest Path, 0/1 Knapsack problem. Back Tracking: General Method, 8 – Queen's Problem, Graph Coloring. **Branch–and–Bound**: The Method, LC Search, Control Abstraction, Bounding, 0/1 Knapsack Problem.

Total Periods:59

TEXT BOOKS:
1. G. A. V. Pai, *"Data Structures and Algorithms: Concepts, Techniques and Applications,"* Mc Graw Hill, First Edition, 2008.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran*, "Fundamentals of Computer Algorithms,"* Universities Press (India) Pvt. Ltd, Second Edition, 2008

REFERENCE BOOKS:
1. D. Samanta, *"Classic Data Structures,"* PHI learning, 2005.
2. Aho, Hopcraft, Ullman, *"Design and Analysis of Computer Algorithms,"* Pearson Education, New Delhi, 2006.
3. Goodman, Hedetniemi, *"Introduction to the Design and Analysis of Algorithms,"* TMH,2008.
4. Drozdek, *"Data Structures and Algorithms in C++,"* Second Edition, Cengage learning, 2010.

M. Tech (Computer Science) I-Semester
(14MT10505) DISCRETE STRUCTURES AND GRAPH THEORY

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	-	-	4

PREREQUISITE: *A course on "Engineering Mathematics".*

COURSE DESCRIPTION:
Mathematical logic, predicates; Set Theory – functions and algebraic structures; Elementary combinatorics and recurrence relations; Graphs, Graph Theory and applications

COURSE OUTCOMES:
On Successful Completion of this course, the student will be able to:
CO1. Gain knowledge in:
- Statements and sets.
- Algebraic Structures.
- Graphs and trees.

CO2. Analyse problems related to discrete mathematics and graphs.
CO3. Develop solutions to problems related to discrete mathematics and graphs.

UNIT-I: MATHEMATICAL LOGIC, PREDICATES (Periods:11)
MATHEMATICAL LOGIC: Statements and notations, Connectives, Well formed formulas, Truth Tables, Tautology, equivalence implication, Normal forms.
Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

UNIT-II: SET THEORY, FUNCTIONS, ALGEBRAIC STRUCTURES
(Periods:12)
SET THEORY: Properties of binary relations, equivalence, compatibility and partial ordering relations, Hasse diagram, Lattice and its properties
FUNCTIONS: Inverse functions, Composite of functions, Recursive functions
ALGEBRAIC STRUCTURES: Algebraic systems, examples and general properties, Semi groups and Monoids, groups and sub groups, Homomorphism, Isomorphism.

UNIT-III: ELEMENTARY COMBINATORICS, RECURRENCE RELATIONS
(Periods:12)
ELEMENTARY COMBINATORICS: Basis of counting, Combinations & Permutations with repetitions, Constrained repetitions, Binomial Coefficients, Binomial and Multinomial theorems, the principles of Inclusion, Exclusion, Pigeon hole principles and its application.
RECURRENCE RELATIONS: Generating functions, function of Sequences, calculating coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating functions, Characteristics roots solution of in homogeneous recurrence relation.

UNIT-IV: GRAPHS   **(Periods:11)**
GRAPHS: Introduction to Graphs, Types of Graphs, Graph basic terminology and Special types of simple graphs, Representation of Graphs and Graph Isomorphism, Euler Paths and Circuits, Hamiltonian Paths and Circuits, Planar Graphs, Euler's formula and Graph coloring.

UNIT-V: GRAPH THEORY AND ITS APPLICATIONS   **(Periods:10)**
GRAPH THEORY AND ITS APPLICATIONS:
Introduction to Trees, Properties of Trees, Applications of Trees-Spanning trees, Counting trees, Depth-First Search, Breadth-First Search, Minimum Spanning trees, Kruskal's Algorithm and Prim's Algorithm.

                                                             Total Periods: 56

TEXT BOOKS:
1. J.P. Trembly and R. Manohar, "*Discrete Mathematical Structures with Applications to Computer Science*," New Delhi:Tata McGraw Hill, 2009.
2. Kenneth H. Rosen, "*Discrete Mathematics and its Applications*," Sixth edition, New Delhi: Tata Mc Graw Hill, 2009

REFERENCE BOOKS:
1. Joe L.Mott and Abraham Kandel, "*Discrete Mathematics for Computer Scientists and Mathematicians*," Second edition, New Delhi, Prentice Hall of India Private Limited, 2004.
2. C.L. Liu and D.P. Mohapatra, "*Elements of Discrete Mathematics*," Third edition, New Delhi: McGraw Hill, 2008.
3. Ralph P. Grimaldi and B.V.Ramana, "*Discrete and Combinatorial Mathematics- An Applied Introduction*," Fifth edition, New Delhi: Pearson Education, 2006.

M. Tech. (CS)-I Semester
(14MT10506) COMPUTER GRAPHICS AND ANIMATION
(ELECTIVE-I)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	-	-	4

PREREQUISITES: A course on "Engineering Mathematics"

COURSE DESCRIPTION
Principles of computer graphics design; 2D, 3D geometric transformations and viewing; 3D object representations; Introduction to Animation

COURSE OUTCOMES
On successful completion of this course, the student will be able to:
CO1. Gain knowledge in
- Raster and Random Scan Display Devices.
- 2D and 3D transformations, 2D and 3D Viewing.
- Line and Circle Drawing, Line and Polygon Clipping algorithms.
- Visible Surface Detection Methods.
- Hermite, Bezier, B-Spline Curves and Surfaces.
- Design Animation and motion specification.

CO2. Analyze the issues in projecting graphical objects and identify solutions.
CO3. Develop solutions to problems related to computer graphics and animations by creating, rendering and projecting the Graphical objects

UNIT – I: INTRODUCTION TO COMPUTER GRAPHICS AND OUTPUT PRIMITIVES (Periods:12)
Introduction: Applications of Computer Graphics, Graphical Input and Output devices, Raster scan devices (Plasma Panel Display, LCD Panels), Random scan devices.
Output Primitives: Points and Lines, Line drawing algorithms(DDA Algorithm, Bresenham's Algorithm), Mid-Point circle and Ellipse algorithms, Filled area primitives: Scan line, Polygon fill algorithm, Boundary-fill algorithm, Flood-fill algorithm.

UNIT – II: TWO DIMENSIONAL GEOMETRIC TRANSFORMATIONS AND VIEWING (Periods:12)
Two Dimensional Geometric Transformations: Basic transformations, Matrix representations and homogeneous coordinates, Composite transformations, other transformations, transformations between coordinate systems, Raster methods for transformations.
Two Dimensional Viewing: The viewing Pipeline, Window-to-Viewport coordinate transformation, clipping operations, Point clipping, Line clipping (Cohen-Sutherland Line clipping), Polygon clipping (Sutherland-Hodgeman Polygon clipping).

UNIT -III: THREE DIMENSIONAL GEOMETRIC AND MODELING TRANSFORMATIONS AND VIEWING (Periods:12)

3D Geometric and Modeling Transformations: Introduction, translation, rotation, scaling, other transformations, composite transformations, modeling and coordinate transformations **3D Viewing**: Viewing Pipeline, Viewing coordinates, projections, View volumes and general projection transformations, Clipping.

UNIT – IV: THREE DIMENSIONAL OBJECT REPRESENTATIONS

(Periods:11)

3D Object Representations: Visible surface detection methods (Back-Face Detection, Depth-Buffer Method, Depth Sorting Method), Spline representation, Hermite Curve, Bezier Curve and B-Spline Curves, Bezier and B-Spline surfaces.

UNIT–V: ANIMATION (Periods:09)

Animation: Introduction, Historical background, Uses of animation, Traditional animation, Principles of Animation, Design of Animation sequences, Computer based animation, Raster animations, motion specifications, Rendering algorithms, Animation file formats, animation software.

Total Periods: 56

TEXT BOOKS:
1. Donald D. Hearn, M. Pauline Baker, "*Computer Graphics-C Version*," Second Edition, New Delhi, Pearson Education, 2008.
2. Malay K.Pakhira, "*Computer Graphics Multimedia and Animation*," Second Edition, New Delhi, PHI Learning, 2010.

REFERENCE BOOKS:
1. Ranjan Parekh, "*Principles of Multimedia,*" Second Edition, New Delhi, Tata McGraw-Hill, 2013.
2. James D.Foley, Andries Van Dam, Steven K.Feiner and John F.Hughes*," Computer Graphics Principles and Practice in C,*" Second Edition, New Delhi, Pearson Education, 2012.
3. David F.Rogers, "*Procedural Elements for Computer Graphics,*" Second Edition, New Delhi, Tata McGraw-Hill, 1997.
4. Zhigang Xiang, Roy A. Plastock, "*Computer Graphics,*" Second Edition, United States of America, McGraw-Hill, 2000.

M. Tech. (CS)-I Semester
(14MT10507) EMBEDDED SYSTEMS (ELECTIVE-I)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	--	--	4

PREREQUISITES: *Courses on* "Computer Organization" and "Operating Systems".

COURSE DESCRIPTION
Introduction to Embedded Systems and components; Micro controller and embedded programming; Processes and Real time operating systems; Embedded Systems development

COURSE OUTCOMES:
On successful completion of this course the students will be able to
CO1. Gain advanced knowledge in
  - Embedded system components.
  - Micro controller programming.
  - Programming in Embedded systems.
CO2. Analyze complex engineering problems critically for conducting research in Embedded Systems.
CO3. Solve engineering problems with wide range of solutions in Embedded Systems.
CO4. Apply appropriate techniques, resources and tools in the design and development of Embedded Systems.

UNIT-I: INTRODUCTION TO EMBEDDED SYSTEMS   (Periods:12)
Introduction, Complex systems and Microprocessors, Component fundamentals and Design, Processor embedded into a system, Embedded hardware units and Devices in a system, Embedded software in a system, examples of embedded system, embedded System-on-chip (Soc) and Use of VLSI circuit design technology, Complex systems design and Processors, Design process in Embedded System, formalization of system design, Classification of Embedded Systems.

UNIT-II: MICRO CONTROLLER   (Periods:12)
8051 Architecture, Real World Interfacing, Introduction to Advanced Architectures, Processor and Memory Organization, Instruction-level parallelism, memory-types, memory-maps and addresses, processor selection, memory selection.

UNIT-III: EMBEDDED PROGRAMMING   (Periods:12)
Program Modeling Concepts and Embedded Programming: Program Models, DFG Models, State Machine Programming Models for Event-controlled Program Flow, Modeling of Multiprocessor Systems, UML Modeling. Software Programming in Assembly Language (ALP) and in High-Level Language 'C', **C Program Elements:** Header and Source Files and Preprocessor Directives, Program Elements: Macros tend Functions, Program Elements: Data Types, Data Structures, Modifiers, Statements, Loops and Pointers.

UNIT-IV: PROCESSES AND REAL-TIME OPERATING SYSTEMS
(Periods:14)

Processes, Threads and Tasks: Multiple Processes in an Application, Multiple Threads in an Application, Tasks, Task States, Task and Data, Concept of Semaphores, Shared Data , Inter-process Communication, Signal Function, Semaphore Functions, Message Queue Functions, Mailbox Functions, Pipe Functions.

Real-Time Operating Systems: OS Services, Process Management, Timer Functions, Event Functions, Memory Management.

UNIT-V: EMBEDDED SYSTEM DEVELOPMENT **(Periods:10)**

Embedded Software Development Process and Tools: Introduction to Embedded Software, Development Process and Tools, Host and Target Machines, Linking and Locating Software, Getting Embedded Software into the Target System, Issues in Hardware–Software Design and Co-design. Testing on Host Machine, Simulators, and Laboratory Tools

Total periods: 60

TEXT BOOKS:
1. Rajkamal, "Embedded Systems Architecture - Programming and Design," Tata McGraw Hill, Second Edition, 2003.

REFERENCE BOOKS:
1. Wayne Wolf, *"Computers as Components - Principles of Embedded Computing System Design,"* Morgan Kaufman Publishers, First Indian Reprint, 2001.
2. Steve Heath, *"Embedded Systems Design,"* Second Edition, Newnes Publications, 2003.
3. David E. Simon, *"An Embedded Software Primer,"* Pearson Education, First Indian Reprint, 2000.

M. Tech. (CS)-I Semester
(14MT10508) INFORMATION RETRIEVAL SYSTEMS
(ELECTIVE-I)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	--	--	4

PREREQUISITE: *A Course on* "Database Management Systems".

COURSE DESCRIPTION
Information retrieval systems; Indexing and data structures; Automatic Indexing and clustering; User search techniques; Text search algorithms

COURSE OUTCOMES:
On successful completion of this course the students will be able to :
CO1. Gain knowledge in fundamental concepts of
- Information Retrieval System capabilities.
- Data Structures.
- Indexing and Search Algorithms.

CO2. Perform analysis of Databases, Data warehouses of Real time Applications.
CO3. Solve complex search problems.
CO4. Design and Develop text processing, text pattern matching algorithms
CO4. Implement clustering algorithms on different types of Term/Item sets.

UNIT - I: INTRODUCTION TO INFORMATION RETRIEVAL SYSTEMS
(Periods:11)

Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses
Information Retrieval System Capabilities: Search, Browse.
UNIT - II: INDEXING AND DATA STRUCTURES   (Periods:13)
Objectives of Indexing, Indexing Process, Automatic Indexing
Data Structures: Introduction to Data Structures, Stemming Algorithms, and Inverted file structures, N-gram data structure, PAT data structure, Hypertext data structure.
UNIT - III: AUTOMATIC INDEXING AND CLUSTERING   (Periods:10)
Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing. **Document and Term Clustering:** Introduction to Clustering, Thesaurus generation, Manual clustering, Automatic Term Clustering, Hierarchy of clusters.
UNIT - IV: USER SEARCH TECHNIQUES   (Periods:12)
Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems.
UNIT V: TEXT SEARCH ALGORITHMS   (Periods:11)
Introduction to Text Search Techniques, Software text search algorithms, Hardware text search systems.

Information System Evaluation: Introduction to Information System Evaluation, Measures used in system evaluation.

Total Periods:57

TEXT BOOKS:
1. Kowalski, Gerald, Mark T Maybury Kluwer, *"Information Storage and Retrieval Systems: Theory and Implementation"*, Springer, Second Edition, 2008.
2. William B Frakes, Ricardo Baeza-Yates, *"Information Retrieval Data Structures and Algorithms"*, Pearson Education, 2009.

REFERENCES:
1. Ricardo Baeza-Yates,*"Modern Information Retrieval"*, Pearson Education, 2007.
2. David A Grossman and Ophir Frieder, *"Information Retrieval: Algorithms and Heuristics"*, Springer International Edition, Second Edition, 2012.

M.Tech (CS) I-Semester
(14MT10509) SOFTWARE PROJECT MANAGEMENT
(ELECTIVE-I)

Int. Marks 40	Ext. Marks 60	Total Marks 100		L 4	T --	P --	C 4

PREREQUISITE: *A course on"*Software Engineering"

COURSE DESCRIPTION
Software effort estimation models; Improving software economics; Software life cycle; Model based software architectures; Project organizations and responsibilities

COURSE OUTCOMES:
On successful completion of this course the students will be able to :

CO1. Gain knowledge on project planning and management, client management and project Scheduling and monitoring.

CO2. Analyze the testing based approach to development, team management and ongoing Project schedule tracking.

CO3. Apply Software Metrics for a given Project to calculate Cost estimation models.

UNIT-I: SOFTWARE EFFORTS ESTIMATION TECHNIQUES   (Periods:10)

The Waterfall model, Conventional Software Management Performance, Evolution of Software Economics, Software Economics

UNIT-II: IMPROVING SOFTWARE ECONOMICS   (Periods:12)

Reducing Software product size, improving software processes, improving team effectiveness, improving automation, achieving required quality, peer inspections, the old way and the new, the principles of conventional software Engineering, and principles of modern software management.

UNIT-III: LIFE CYCLE PHASES   (Periods:10)

Engineering and production stages, inception, Elaboration, construction phase, transition phases, Artifacts of the process, the artifact sets, Management artifacts, engineering artifacts.

UNIT-IV: MODEL BASED SOFTWARE ARCHITECTURES   (Periods:11)

A Management perspective and Technical perspective, Workflows of the process, Software process workflows, Iteration workflows.

Checkpoints of the Process- Major mile stones, Minor Milestones, Periodic status assessments, Iterative Process Planning, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

UNIT-V: PROJECT   ORGANIZATIONS   AND   RESPONSIBILITIES
(Periods:12)

Line-of-Business organization,   Project organizations,   evolution of organizations, Automation building blocks, The project environment, the seven core metrics,   Management indicators, quality indicators, life cycle expectations, Software Metrics automation, Tailoring the process discriminates, COCOMO cost estimation model.

Total Periods: 55

TEXT BOOKS:
1. Walker Royce, "*Software Project Management,*" Seventeenth Edition, Pearson Education, New Delhi, 2012.

REFERENCE BOOKS:
1. Bob Hughes and Mike Cottrell, "*Software Project Management,*" Fourth Edition, Tata McGraw-Hill, New Delhi, 2006
2. JoelHenry," *Software Project Management,*" First Edition, Pearson Education, New Delhi,2008.
3. Pankaj Jalote, "*Software Project Management in Practice,*" Seventh Edition, Pearson Education, New Delhi, 2008

I M. Tech (CS) I Semester
(14MT10521) DATA STRUCTURES AND ADVANCED DATABASE MANAGEMENT SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
25	50	75		--	--	4	2

PREREQUISITES: Courses on "Data structures" and "DBMS"

COURSE DESCRIPTION
Practical implementation of linked lists, stacks, queues, binary search tree, AVL tree, B-tree, graphs, N-Queen's problem using C++

Designing and implement basic SQL Queries, PL/SQL and advanced concepts in PL/SQL such as Object creation structures, Triggers, Embedded SQL using Oracle Database Management System Package.

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Develop solutions to advanced data structures based problems and advanced DBMS problems.
CO2. Use modern software tools and technologies for designing simple to complex applications in real world.
CO3. Develop effective professional and business communication in data structures and DBMS.
CO4. Attitude for independent and continuous learning for improved knowledge with newer versions of object oriented software and DBMS packages.

Data Structures Exercises:
1. Implementation of Stacks and Queue operations using linked list.
2. Perform the following operations on binary search tree:
    a) Insertion
    b) Deletion
    c) Searching
3. Perform the following operations on AVL-tree:
    a) Insertion
    b) Deletion
4. Implementing the following operations on B-Tree:
    a) Insertion
    b) Searching
    c) Deletion
5. Implement the following using recursive and non-recursive traversals:
    a) Pre-order
    b) In-order
    c) Post-order.

6. Implement the following functions of a dictionary using hashing:
     a) Insertion
     b) Searching
     c) Deletion
7. Implement single source shortest path in a graph by using Bellman and Ford algorithm.
8. Implement N-queen's problem using Backtracking. The N Queen is the problem of placing N chess queens on an N×N chessboard so that no two queens attack each other. The expected output is a binary matrix which has 1s for the blocks where queens are placed. For example following is the output matrix for above 4 queen problem's solution.
     {0, 1, 0, 0}
     {0, 0, 0, 1}
     {1, 0, 0, 0}
     {0, 0, 1, 0}

ADBMS Exercises:
  1. Consider the following tables:
     WORKS(Pname, Cname, Salary)
     LIVES(Pname, Street, City)
     LOCATED_IN(Cname, City)
     MANAGER(Pname, Mgrname)
     Where Pname = Person name, Cname = Company name, and
     Mgrname = Manager name.

     Write the SQL for the following:
     1. List the names of the people who work for the company Wipro along with the cities they live in.
     2. Find the people who work for the company 'Infosys' with a salary more than Rs. 50000/-. List the names of the people, along with the street and city address.
     3. Find the names of the persons who live and work in the same city.
     4. Find the names of the persons who do not work for 'Infosys'.
     5. Find the persons whose salaries are more than that of all of the 'Oracle' employees.
     6. Find the names of the companies that are located in every city where the company 'Infosys' is located.

  2.   Write a PL/SQL block to do the following:
     a. Read a number n, and print the multiplication table.
     b. Read a number and check whether it is a palindrome or not.
  3.   a. Write a PL/SQL block that updates salary of an employee in employee table by using incr function which takes employee number as argument, calculates increment and returns increment based on the following criteria.
        If salary <= 3000   increment = 30% of salary
        If salary > 3000 and <= 6000   increment = 20% of salary
        Else increment = 10% of salary.

b. Write a stored procedure, raise salary which accepts an employee number. It uses incr function of previous program to get the salary increase amount and uses employee number to select the current salary from employee table. If employee number is not found or if the current salary is null, it should raise an exception. Otherwise, updates the salary.

4.　　a. Consider the following Relation Schemas
　　　　SALGRADE

GRADE	LOSAL	HISAL

　　　　EMP_SAL

ENO	ENAME	SAL	GRADE

Create a database trigger emp_sal. This trigger is forced when an INSERT or an UPDATE is performed on the table EMP_SAL.Trigger to insert into EMP_SAL table when salary between lowsal and highsal (in SALGRADE table).And to update the record in EMP_SAL table.(before)

b. Consider the following Relation Schemas
　　PERSINFO

EMPNO	NAME	AGE

　　AUDITPERSINFO

EMPNO	NAME	AGE	OPERATION	ODATE

PERSINFO is the table for which the auditing must be performed and AUDITPERSINFO is the table which keeps track of the records deleted or modified. Create a database trigger audit_trial. This trigger is forced when an UPDATE or a DELETE is performed on the table PERSINFO. It first checks for the operation being performed on the table. Then depending on the operation, a variable (that corresponds to operation) is assigned the value 'UPDATE' or 'DELETE' and then inserts the updated/deleted record into AUDITPERSINFO.

5.　　Implement Database Objects and creation of object structures for complex relations.
6.　　Implement C program segment with embedded SQL.

M. Tech (Computer Science) – I Semester
(14MT10310) RESEARCH METHODOLOGY
(Common to all M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	--	--	3

PRE-REQUISITES: --

COURSE DESCRIPTION:
Fundamentals of research work - research problem and design; Data collection, Analysis and hypothesis; Statistics in Research; Interpretation and Report Writing.

COURSE OUTCOMES:
On successful completion of course, the student will be able to
CO1. Gained knowledge on research approaches, research process and data collection.
CO2. Identify and analyze research problem.
CO3. Have skills to solve the problems using statistical methods.
CO4. Do literature survey and apply good research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
CO5. Select, learn and apply modern engineering tools to complex engineering activities.
CO6. Write effective research reports.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION TO RESEARCH METHODOLOGY (Periods:07)
Objectives and Motivation of Research, Types of Research, Research Approaches, Research Process, Criteria of good Research.
UNIT-II: RESEARCH PROBLEM AND DESIGN (Periods:09)
Defining and Formulating the Research Problem, Problem Selection, Necessity of Defining the Problem, Techniques involved in Defining a Problem. Features of Good Design, Research Design Concepts, Different Research Designs.
UNIT-III: DATA COLLECTION, ANALYSIS, AND HYPOTHESIS (Periods:09)
Different Methods of Data Collection, Processing Operations, Types of Analysis, Basic Concepts of Testing of Hypothesis, Hypothesis Testing Procedure.
UNIT-IV: STATISTICS IN RESEARCH (Periods:09)
Review of Statistical Techniques - Mean, Median, Mode, Geometric and Harmonic Mean, Standard Deviation, Measure of Asymmetry. Normal Distribution, Chi-Square Test as a Test of Goodness of Fit.
UNIT-V: INTERPRETATION AND REPORT WRITING (Periods:06)
Interpretation – Techniques and Precautions. Report Writing – Significance, Stages, Layout. Types of reports, Precautions in Writing Reports.

Total Periods: 40

TEXT BOOK:
1. C.R. Kothari, *Research Methodology: Methods and Techniques*, New Age International Publishers, New Delhi, 2nd Revised Edition, 2004.

REFERENCE BOOKS:
1. Ranjit Kumar, *Research Methodology: A step-by-step guide for beginners*, Sage South Asia, 3rd ed., 2011.
2. R. Panneerselvam, Research Methodology, PHI learning Pvt. Ltd., 2009

M. Tech (Computer Science) II-Semester
(14MT20501) ADVANCED COMPUTER ARCHITECTURE

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	--	--	4

PREREQUISITE: *A course on* "Computer Organization".

COURSE DESCRIPTION
Quantitative design and analysis, memory hierarchy design; parallel computer models and network properties; pipelining, superscalar techniques, multiprocessors and multi computers; Multi-Vector, SIMD and Multi-Core computers

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain knowledge of:
- Computational models and Computer Architectures.
- Concepts of parallel computer models.
- Scalable Architectures.
- Pipelining, Superscalar processors, multiprocessors, SIMD and Multi core Computers.

CO2. Analyze and design the architectures of parallel computers and their interconnection structures.
CO3. Apply the advanced computer architectures to solve complex engineering problems.

UNIT-I: FUNDAMENTALS OF QUANTITATIVE DESIGN AND ANALYSIS, MEMORY HIERARCHY DESIGN (Periods:10)
Fundamentals of Quantitative Design and Analysis: Introduction, Classes of computers, Defining Computer Architecture, Trends in technology, Trends in power and energy in ICs, Trends in cost, Dependability, Quantitative Principles of Computer Design.
Memory Hierarchy Design: Introduction, Advanced optimizations of cache performance, Memory technology and optimizations, Cross cutting issues–The design of memory hierarchies.

UNIT-II: PARALLEL COMPUTER MODELS AND NETWORKS PROPERTIES (Periods:12)
Parallel Computer Models: The state of computing, Multiprocessors and multi-computers, Multi vector and SIMD computers, PRAM and VLSI models.
P**rogram and Networks Properties:** Conditions of Parallelism, Program partitioning and scheduling, Program flow mechanisms, System interconnect architectures.
Examples: Detection of Parallelism in a program using Bernstein's conditions.

UNIT-III: PRINCIPLES OF SCALABLE PERFORMANCE AND MEMORY (Periods:12)
Principles of Scalable Performance: Performance metrics and measures, Parallel Processing applications, Speedup performance laws.

Bus, Cache and Shared memory: Bus systems, Cache memory organizations, Shared memory organizations.

Example Architectures: The virtual address split cache design in Intel i860

UNIT-IV: PIPELINING AND SUPERSCALAR TECHNIQUES, MULTIPROCESSORS AND MULTICOMPUTERS   (Periods:12)

Pipelining and Superscalar Techniques: Linear pipeline processors, nonlinear pipeline processors, Instruction pipeline design, Arithmetic pipeline design.

Multiprocessors and Multi-computers: Multiprocessor system interconnects Cache Coherence and synchronization mechanisms.

Example Architectures: The floating point unit in Motorola MC68040

UNIT-V: MULTIVECTOR AND SIMD COMPUTERS, MULTICORE COMPUTERS   (Periods:12)

Multi-Vector and SIMD computers: Vector processing principles, Multi-vector multiprocessors, SIMD computer organizations, and Graphics processing units.

Computer Architecture of Warehouse – Scale Computers, Cloud Computing – the return of utility computing.

Multi-Core computers: Hardware performance issues, Software performance issues, Multi-core organization.

Example Architectures: ARM11 MPCore

Total Periods:58

TEXT BOOKS:

1. Kai Hwang and Naresh Jotwani, *"Advanced Computer Architecture,"* Second Edition, New Delhi, McGraw Hill, 2011.
2. John L. Hennessy and David A. Patterson, *"Computer Architecture-A Quantitative Approach,"* Fifth Edition, Elsevier, 2012

REFERENCE BOOKS:

1. William Stallings, *"Computer Organization and Architecture-Designing for performance,"* Ninth Edition, Pearson Education, 2014.
2. Kai Hwang *"Advanced Computer Architecture,"* First Edition, New Delhi, Tata McGraw Hill, 2001.
3. Anantha Grama, Anshul Gupta, George Karypis and Vipin Kumar, *"Introduction to Parallel Computing,"* Second Edition, New Delhi, Pearson Education, 2003.

M. Tech. (CS)-II Semester
(14MT20502) ADVANCED OPERATING SYSTEMS

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	--	--	4

PREREQUISITE: *A Course on "Operating Systems"*

COURSE DESCRIPTION
Process management and process scheduling; Concurrency, synchronization and deadlocks; Memory management, file system and secondary storage; I/O systems, protection and security; Introduction to Distributed Systems, Synchronization in Distributed Systems, Real-time and multimedia systems

COURSE OUTCOMES:
On successful completion of this course the students will be able to
CO1. Gain advanced knowledge in
- Process management concepts including scheduling.
- Synchronization.
- Inter Process Communication.
- Group Communication.
- Remote Procedure Call.

CO2. Understand how operating system manages resource sharing among the computer's users.
CO3. Develop solutions to problems related to synchronization to meet the needs of society and industry.
CO4. Use concepts such as semaphores, monitors, message-passing and other forms of synchronization among threads.

UNIT–I: INTRODUCTION TO OPEARATING SYSTEMS, PROCESS MANAGEMENT AND PROCESS SCHEDULING (Periods:12)
Introduction: Operating system operations, Protection and Security, Distributed Systems, Special Purpose Systems, Open-Source Operating Systems, Operating System Services, System Calls, Virtual machines.
Process Management: Process Concepts, Process State, Process Control Block, Operations on Processes, Inter Process Communication, Multithreaded programming.
Process Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple-Processor scheduling, thread scheduling.
UNIT – II: CONCURRENCY AND SYNCHRONIZATION, DEADLOCKS (Periods:12)
Concurrency and Synchronization: Process Synchronization, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of synchronization, Readers and Writers Problem, Dining Philosophers Problem, Monitors.
Deadlocks: System Model, Deadlock Characterization, Deadlock Prevention, Deadlock Detection and Avoidance, Recovery from Deadlock- Bankers Algorithm

UNIT -III: MEMORY MANAGEMENT, FILE SYSTEM IMPLEMENTATION AND SECONDARY STORAGE STRUCTURE   (Periods:14)
Memory Management: Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.
File System Interface &Implementation: Concept of a File, Access Methods, Directory Structure, File Sharing, Protection, Allocation Methods, Free Space Management, Efficiency and Performance.
Secondary Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk scheduling algorithms, Swap-Space Management, Stable-Storage Implementation, Tertiary Storage Structure.
UNIT – IV: I/O SYSTEMS, PROTECTION AND SECURITY   (Periods:12)
I/O Systems: I/O systems, Hardware, Application Interface, Transforming I/O requests Hardware Operation, STREAMS, Performance
Protection: Goals of Protection, Principles of Protection, Domain of Protection Access Matrix, Implementation of Access Matrix, and Access control, Revocation of Access Rights.
Security: The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication, Implementing Security Defenses, Firewalling to Protect Systems
UNIT–V: DISTRIBUTED   SYSTEMS,   SYNCHRONIZATION   IN DISTRIBUTED SYSTEMS, SPECIAL PURPOSE SYSTEMS   (Periods:08)
Introduction to Distributed systems: Goals of distributed system- hardware and software concepts- design issues, the client server model- Remote Procedure Call and Group Communication.
Synchronization in distributed systems: Clock Synchronization- Election Algorithms- the Bully Algorithm- a Ring Algorithm.
Special Purpose Systems: Real-Time Systems- Characteristics, Real-Time CPU Scheduling, Multimedia Systems-CPU Scheduling

Total Periods: 58

TEXT BOOKS:
1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne," *Operating System Concepts*," John Wiley and Sons**,** Eighth Edition, 2009.
2. Andrew. S. Tanenbaum, "*Distributed Operating System*," New Delhi, Prentice Hall,1995.

REFERENCE BOOKS:
1. William Stallings, "*Operating Systems – Internals and Design Principles*," New Delhi, Fifth Edition, Pearson Education, 2008
2. Andrew S Tanenbaum "*Modern Operating Systems*," New Delhi, Third Edition, Pearson Education, 2008
3. Charles Crowley "*Operating Systems - A Design Approach,*" New Delhi, First Edition, TMH, 2009.

M. Tech. (CS)-II Semester
(14MT20503) DATA WAREHOUSING AND DATA MINING

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	--	--	4

PREREQUISITE: *A course on* "Database Management Systems"

COURSE DESCRIPTION
Introduction to Data Warehouse and data mining; Data preprocessing, mining and associations; Data Classification and prediction; Cluster Analysis; Mining Data streams – Time series, Spatial, Multimedia and text data

COURSE OUTCOMES:
On successful completion of this course, the student will be able to:
CO1. Gain knowledge in:
- Data warehousing and enterprise intelligence in industry and government.
- Data mining algorithms.
- Association Rules, Classification and Prediction and Cluster Analysis.

CO2. Analyse the results generated from the constructed artifact to determine if patterns of clusters were detected in the Data sets.

CO3. Develop solutions to problems related to frequent item sets.

CO4. Apply data mining techniques in mining time series, spatial data, World Wide Web, text and multimedia data

UNIT-I: INTRODUCTION TO DATA WAREHOUSE AND DATA MINING
(Periods:10)

Data Warehouse- A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehouse to Data Mining.

Data Mining – Kinds of Data, Data Mining Functionalities, Primitives, Major Issues in Data Mining

UNIT-II: DATA PREPROCESSING, MINING FREQUENT PATTERNS AND ASSOCIATIONS   (Periods:10)

Data Preprocessing- Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction.

Mining Frequent Patterns and Associations- Efficient and Scalable Frequent Item set Mining Methods, Mining various kinds of Association Rules, Constraint based association mining.

UNIT-III: CLASSIFICATION AND PREDICTION   (Periods:09)
Issues regarding classification and prediction, classification by decision tree induction, Bayesian classification, Rule based classification, classification by Back propagation, Prediction, Accuracy and Error Measures.

UNIT-IV: CLUSTER ANALYSIS   (Periods:13)
Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, density based Methods,

Grid based methods, and model based clustering methods; Clustering high dimensional data, and Outlier analysis.

UNIT-V: MINING STREAM, TIME SERIES, SPATIAL DATA, MULTIMEDIA, TEXT AND WEB MINING **(Periods:12)**

Mining Data Streams, Mining Time Series Data, Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Total Periods:54

TEXT BOOK:

1. Jiawei Han and Micheline Kamber, "*Data Mining: Concepts and Techniques,*" Second   Edition, Elsevier, 2009

REFERENCE BOOKS:

1. Margaret H Dunham, *Data Mining Introductory and Advanced Topics*," Second Edition, Pearson Education, 2006
2. Amitesh Sinha, "*Data Warehousing,*" PHI Learning, 2007
3. Xingdong Wu, Vipin Kumar, "*The Top Ten Algorithms in Data Mining,*" Taylor and Francis Group, 2009

M. Tech. (CS)-II Semester
(14MT20504) OBJECT ORIENTED ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	-	-	4

PREREQUISITE: *A Course on* "Object Oriented Programming".

COURSE DESCRIPTION
Introduction to Unified Modeling language; Sequence and collaboration diagrams; Behavioral Modeling; Unified Process and phases of unified process

COURSE OUTCOMES:
On successful completion of this course the students will be able to :

CO1. Gain knowledge on
- Object Oriented Methodologies.
- UML Diagrams.
- Unified Process.

CO2. Develop and apply analysis models which are required for solving problems.

CO3. Get exposure to Visual Modeling tools.

CO4. Develop UML models that are necessary for communication among stake holders.

UNIT – I: INTRODUCTION TO UML   (Periods:13)
Introduction to UML: Importance of Modeling, Principles of Modeling Object Oriented Modeling, Conceptual Model of the UML Architecture.
Basic Structural Modeling: Classes, Relationships, Common Mechanisms, and Diagrams.
Advanced Structural Modeling: Advanced Classes, Advanced Relationships
Class Diagram: Terms, Concepts, Modeling Techniques for Class Diagram.

UNIT – II: INTERACTION DIAGRAMS AND COLLABORATION DIAGRAMS
                                                (Periods:12)
Interaction Diagrams: Sequence Diagrams: Terms, Concepts and Common Modeling Techniques **Collaboration Diagrams:** Terms, Concepts and Common Modeling Techniques.
Basic Behavioral Modeling: Use Cases, Use Case Diagrams, Activity Diagrams.

UNIT -III: ADVANCED BEHAVIORAL MODELING   (Periods:11)
Advanced Behavioral Modeling: Events And Signals, State Machines, State Chart Diagrams.
Architectural Modeling: Component, Deployment, Component Diagrams and Deployment Diagrams.
Case Studies: Online Bookshop, A Multi Threaded Airport Simulation.

UNIT – IV: THE UNIFIED PROCESS: (Periods:11)
The Unified Process: Use Case Driven, Architecture Centric, Iterative and Incremental.
The Four Ps: People, Project, Product, and Process.

Use Case Driven Process: Why Use Case, Capturing Use Cases, Analysis, Design, and Implementation to realize the Use Cases, Testing the Use Cases.

Architecture-Centric Process: Architecture in brief, Use Cases and Architecture, An Architecture description.

Iterative Incremental Process: Iterative incremental in brief, the iterative approach is risk driven, the generic iteration.

UNIT – V: PHASES OF UNIFIED PROCESS (Periods:11)

Inception Phase: Early in the inception phase, the archetypal inception iteration workflow, execute the core workflows, Requirements to test.

Elaboration Phase: Elaboration phase in brief, Early in the Elaboration phase, the architectural elaboration iteration workflow, Execute core workflows, Requirements to test.

Construction Phase: Early in the construction phase, the archetypal construction iteration workflow, execute the core workflow.

Transition Phase: Early in the transition phase, Activities in transition phase.

Total Periods:58

TEXT BOOKS:

1. Grady Booch, James Rumbaugh, Ivar Jacobson, *"The Unified Modeling Language User Guide, Pearson Education,"* Second Edition, 2006.
2. Ivar Jacobson, Grady Booch, James Rumbaugh, *"The Unified Software Development Process, Pearson Education,"* First Edition, 2009.

REFERENCE BOOKS:

1. Mark Priestley, *"Practical Object-Oriented Design with UML,"* Second Edition, Tata McGraw Hill, 2011.
2. Mike O'Docherty, *"Object-Oriented Analysis and Design with UML Version 2.0,"* Wiley India Pvt. Ltd, 2012.

M. Tech. (CS)-II Semester
(14MT20505) WEB PROGRAMMING

Int Marks 40	Ext Marks 60	Total Marks 100		L 4	T --	P --	C 4

PREREQUISITES: *Courses on* "Programming in C" and "JAVA".

COURSE DESCRIPTION:
Introduction to HTML, Cascaded Style sheets and Java Scripting; Dynamic HTML and XML; PHP and Web Forms; Web Applications using PHP and MYSQL

COURSE OUTCOMES:
On successful completion of this course the students will be able to :
CO1. Gain knowledge in
- HTML and CSS styling.
- Dynamic HTML with Java Script and XML.
- PHP dynamic programming and interaction with databases.

CO2. Analyze the design problems in HTML Web pages with CSS.
CO3. Design a dynamic webpage with HTML, CSS, Java Script, PHP concepts.
CO4. Assess the HTML Website using XML Parsers.
CO5. Create website of societal context for awareness on social and environmental issues.

UNIT – I: INTROUDCTION TO HTML AND CSS   (Periods:11)
Hyper Text Markup Language: Basic HTML, the Document Body, Text, Hyper Links, Adding More Formatting, Lists, Using Color and Images, Images.
More HTML: Tables, Multimedia Objects, Frames, Forms – Towards Interactivity, The HTML Document Head in detail.
Cascading Style Sheets: Introduction, Using Styles, Defining Styles, Properties and Values in Style Sheets, Formatting Blocks of Information, Layers
UNIT – II: JAVA SCRIPTING   (Periods:11)
An Introduction to Java Script: Dynamic HTML, Java Script: Basics, Variables, String Manipulation, Mathematical Function, Statements, Operators, Arrays, Functions.
Objects in Java Script: Data and Objects in Java Script, Regular Expressions, Exception Handling, Built – in Objects, Cookies, Events.
UNIT –III: ADVANCED JAVASCRIPTING AND XML   (Periods:12)
Dynamic HTML With JavaScript: Data Validation, Opening in a new window, Messages and Confirmations, The Status Bar, Writing to a different frame, Rollover Buttons, Moving Images, A Text Only Menu System, Floating Logos.
XML: Defining Data for Web Applications: Basic XML, Document Type Definition, XML Schema, Document Object Model, Presenting XML, Using XML Parser.

UNIT – IV: PREPROCESSOR HYPERTEXT PROGRAMMING   (Periods:14)
An Introduction To PHP: PHP, Introducing PHP, Including PHP in a HTML Page, Data Types, Program Control Structures, Arrays, User Defined Functions, Built-in Functions, Regular Expressions, Using files.
Advanced PHP: PHP and Web Forms, Handling File Uploads: Uploading files with PHP, Session Handlers: Working with Sessions.
UNIT – V: BUILDING WEB APPLICATIONS WITH PHP AND MYSQL
(Periods:07)
Building Web Applications With PHP And MYSQL: Handling Installation Prerequisites, **Using the mysqli Extension** - Setting Up and Tearing down the Connection, Handling Connection Errors, Retrieving Error Information, Storing Connection Information in a Separate File, Securing Your Connection Information.
Interacting with the Database - Sending a Query to the Database, Parsing Query Results, Determining the Rows Selected and Rows Affected, Working with Prepared Statements, Executing Database Transactions, and Enabling Auto commit Mode, Committing a Transaction, Rolling Back a Transaction.
Total Periods:56

TEXT BOOKS:
1. Chris Bates, *"Web Programming: Building Internet Applications,"* Third Edition, New Delhi, India: Wiley India Pvt. Ltd., 2009.
2. W Jason Gilmore, *"Beginning PHP and MySQL: From Novice to Professional,"* Fourth edition, New Delhi, India: Springer India Pvt. Ltd., 2011.

REFERENCE BOOKS:
1. Robin Nixon, *"Learning PHP, MySQL, and JavaScript,"* Second edition, Sebastopol, CA: O'Reilly Media, Inc., 2012.
2. Kevin Tatroe, Peter MacIntyre, and Rasmus Lerdorf, *"Programming PHP,"* Third edition, Sebastopol, CA: O'Reilly Media, Inc., 2002.
3. Marc Wandschneider, *"Core Web Application Development with PHP and MySQL,"* First edition., Prentice Hall Professional Technical Reference, 2006
4. David Flanagan, *"JavaScript: The Definitive Guide,"* Sixth Edition, Sebastopol, CA: O'Reilly Media, Inc., 2011.

M.Tech (Computer Science) II-Semester
(14MT20506) BIG DATA ANALYTICS (ELECTIVE-II)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	-	-	4

PREREQUISITE: *A Course on* "Data Mining and Warehousing".

COURSE DESCRIPTION

Data Science and Analytics; unsupervised learning; big data from business perspective; Hadoop Technology and application development, Management, InfoSphere big insights and info sphere streams

COURSE OUTCOMES:
On successful completion of this course the students will be able to
CO1. To gain knowledge about the
- Data Science and Unsupervised Learning.
- Big data Characteristics and Methods.
- InfoSphere Big insights and Streams.

CO2. To analyze the need for database systems for storing the large data
CO3. To design and model an effective and sustainable database for better performance using Big data tools.
CO4. To use Hadoop tools and Methodologies for modelling large databases and real time applications

UNIT I - INTRODUCTION TO DATA SCIENCE (Periods:11)
Introduction- Introduction of Data Science-Getting started with R, Exploratory Data Analysis, Review of probability and probability distributions, Bayes Rule Supervised Learning, Regression, polynomial regression, local regression, k nearest neighbors.

UNIT II - UNSUPERVISED LEARNING (Periods:12)
Unsupervised Learning, Kernel density estimation, k means- Naive Bayes, Data and Data Scraping Classification-ranking, logistic regression, Ethics- time series advanced regression, Decision trees, Best practices, feature selection.

UNIT III - BIG DATA FROM DIFFERENT PERSPECTIVES (Periods:11)
Big data from business Perspective- Introduction of big data, Characteristics of big data, Data in the warehouse and data in Hadoop, Importance of Big data, Big data Use cases, Patterns for Big data deployment, Big data from Technology Perspective History of Hadoop, Components of Hadoop, Application Development in Hadoop, Getting your data in Hadoop, other Hadoop Component.

UNIT IV – INFOSPHERE BIG INSIGHTS (Periods:11)
InfoSphere Big Insights- Analytics for Big data at rest, A Hadoop, Ready Enterprise, Quality file system, Compression, Administrative tooling, Security, Enterprise Integration, Improved workload scheduling, Adaptive map reduce, Data discovery and visualization, Machine Analytics.

UNIT V- INFOSPHERE STREAMS **(Periods:10)**

InfoSphere Streams- Analytics for Big data in motion, InfoSphere Streams Basics working of InfoSphere Streams, Stream processing language, Operators, Stream toolkits, Enterprise class.

Total Periods:55

TEXT BOOKS:
1. Noreen Burlingame and Lars Nielsen, "A Simple Introduction To Data Science", New Street Communications, LLC, Wickford, Rhode Island**,** 2012.
2. Paul Zikopoulos, IBM, Chris Eaton, Paul Zikopoulos "Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data", The McGraw-Hill Companies, 2012.

REFERENCE BOOKS:
1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012
2. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.

M. Tech. (Computer Science)-II Semester
(14MT20507) INFORMATION SECURITY (ELECTIVE-II)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	-	-	4

PREREQUISITE: A Course on *"Computer Networks".*

COURSE DESCRIPTION:
Introduction to cryptography; message authentication and public key cryptography; Key distribution, user authentication and E-mail security; Internet security, intruders and firewalls

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain advanced knowledge in
- Symmetric and asymmetric encryption algorithms
- Key distribution and message authentication in secure network environment
- Hash algorithms and digital signature techniques
- Multiple access techniques and networking
- Firewall basing and configuration

CO2. Apply the appropriate cryptography scheme & security mechanism for information systems.

UNIT-I: INTRODUCTION TO CRYPTOGRAPHY (Periods:11)
Security Attacks, Security Services, Security Mechanisms, Model for Network Security.
Symmetric Block Encryption- Symmetric Block Encryption Algorithms-DES, Triple-DES, AES, Cipher Block Modes of Operation

UNIT-II: PUBLIC-KEY ENCRYPTION (Periods:11)
Message Authentication-Approaches to Message Authentication, Simple hash function, Secure Hash Functions –SHA-1, SHA-512, Message Authentication Codes and HMAC
Public-Key Cryptography-Public-Key Cryptography Algorithms-RSA, Diffie-Hellman Key Exchange, Digital Signatures, Digital signature standard.

UNIT-III: NETWORK SECURITY APPLICATIONS (Periods:12)
Key Distribution and User Authentication-Kerberos, Key Distribution Using Asymmetric Encryption, X.509 Certificates, Public Key Infrastructure
Electronic Mail Security-Pretty Good Privacy, Key Rings, Multipurpose Internet Mail Extensions, S/MIME - Functionality, Messages and certificate processing.

UNIT-IV: INTERNET SECURITY (Periods:11)
Transport Level Security- Secure Socket Layer and Transport Layer Security.
IP Security-Overview, policy, Encapsulating Security Payload and IKE
Network management security- Concepts of SNMP, SNMPv1 and SNMPv3

UNIT-V: SYSTEM SECURITY   (Periods:12)

Intruders- Intrusion Techniques, Intrusion Detection, Malicious Software - Types, Viruses, Virus Countermeasures, Worms

Firewalls- Firewall Characteristics, Firewall Basing, Types of Firewalls, Firewall Location and Configurations.

Total Periods: 57

TEXTBOOKS:

1. William Stallings, "*Network Security Essentials: Applications and Standards,*" Fourth Edition, New Delhi, Pearson Education, 2011.
2. Douglas R.Stinson, "*Cryptography – Theory and Practice,*" Third edition, CRC Press, 2005.

REFERENCE BOOKS:

1. William Stallings, "*Cryptography and Network Security,*" Fifth edition, New Delhi, Pearson Education, 2011.
2. Eric Maiwald, "*Fundamentals of Network Security*", First edition, McGraw-Hill, 2003.
3. Charlie Kaufman, Radia Perlman, Mike Speciner, "*Network Security, Private communication in a public world,*" Second edition, PHI Learning, 2002.

M. Tech (Computer Science) II-Semester
(14MT20508) MOBILE COMPUTING (ELECTIVE-II)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	--	--	4

PREREQUISITE: *A Course on "Computer Networks".*

COURSE DESCRIPTION
GSM architectures, Wireless MAC, and CDMA Systems; Mobile IP Layers; Databases, Data Dissemination and Broadcasting Systems; Synchronization in mobile Devices and mobile computing systems; Mobile application languages and operating systems.

COURSE OUTCOMES:
On successful completion of this course the students will be able to
CO1. Gain advanced knowledge in
   * GSM and CDMA Systems.
   * Mobile IP, and Mobile TCP
   * Databases and Data Dissemination
   * Mobile data Synchronization
CO2. Analyse various methods in data dissemination and broadcasting systems
CO3. Design Mobile File Systems for various Mobile Devices
CO4. Apply appropriate techniques and tools to design and implement mobile applications.

UNIT- I: GSM AND SIMILAR ARCHITECTURES & WIRELESS MAC AND CDMA – BASED COMMUNICATION (Periods:12)
GSM AND SIMILAR ARCHITECTURES: GSM, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services.
WIRELESS MAC AND CDMA – BASED COMMUNICATION: Medium Access control, Introduction to CDMA-based Systems, Spread Spectrum in CDMA Systems, Coding Methods in CDMA
UNIT- II: MOBILE IP NETWORK LAYER & MOBILE TRANSPORT LAYER (Periods:14)
MOBILE IP NETWORK LAYER: IP and Mobile IP Network Layer, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, Dynamic Host Configuration Protocol.
MOBILE TRANSPORT LAYER: Conventional TCP/IP Transport Layer Protocols, Indirect TCP, Snooping TCP, Mobile TCP, WAP Architecture.
UNIT –III:DATABASES AND DATA DISSEMINATION AND BROADCASTING SYSTEMS (Periods:14)
DATABASES: Database Hoarding Techniques, Data Caching, Client-Server Computing and Adaptation, Transaction Models, Query Processing, Data Recovery Process, Issues Relating to Quality Of Service.

DATA DISSEMINATION AND BROADCASTING SYSTEMS: Communication Asymmetry, Classification of Data-Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Techniques.

UNIT – IV:MOBILE SYNCHRONIZATION IN MOBILE COMPUTING SYSTEMS AND MOBILE DEVICES: SERVER AND MANAGEMENT (Periods:10)

MOBILE SYNCHRONIZATION IN MOBILE COMPUTING SYSTEMS: Synchronization, Synchronization Software for Mobile Devices, Synchronization Protocols, SynML- Synchronization Language for Mobile Computing, Sync4J (Funambol), Synchronized Multimedia Markup Language (SMIL).

MOBILE DEVICES: SERVER AND MANAGEMENT –Mobile Agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems, Security.

UNIT-V   MOBILE APPLICATION LANGUAGES- XML, JAVA, J2ME, AND JAVACARD AND **MOBILE OPERATING SYSTEMS   (Periods:10)**

MOBILE APPLICATION LANGUAGES- XML, JAVA, J2ME, AND JAVACARD: Introduction, XML, JAVA, Java 2 Micro Edition (J2ME), JavaCard.

MOBILE OPERATING SYSTEMS: Operating System, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices

Total Periods:60

TEXT BOOKS:

1. Raj Kamal, *"Mobile Computing,"* OXFORD University Press, Second Edition, 2007.

REFERENCE BOOKS:

1. Jochen H. Schiller, *"Mobile Communications,"* Pearson Education, Second Edition, 2004.
2. Asoke Talukder, Roopa Yavagal, *"Mobile Computing,"* Tata McGraw Hill, Second Edition, 2010.

M. Tech. (CS)-II Semester
(14MT20509) VIRTUALIZATION AND CLOUD COMPUTING
(ELECTIVE-II)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	--	--	4

PREREQUISITES: *Courses on* "Distributed Computing" and "Computer Networks"

COURSE DESCRIPTION:
Introduction to Cloud Computing and virtualization; Map reduce programming; Cloud technologies – Amazon web services, Google App Engine, and Microsoft Azure; Scientific and business applications of Cloud

COURSE OUTCOMES:
On successful completion of this course the students will be able to
CO1. Gain Knowledge on the technical foundations of Cloud technology.
CO2. Analyze the Cloud Architectures while developing the internet web applications.
CO3. Solve security issues in cloud applications.
CO4. Get exposure to cloud tools like Microsoft Azure, Google App Engine, and Amazon Web Services.

UNIT- I: VIRTUALIZATION   **(Periods:13)**
Introduction to Virtualization, Objectives of Virtualization, History of Virtualization, benefits of virtualized technology, The virtual service desk, related forms of computing, Understanding Hypervisors, Load balancing & Virtualization. Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples-Xen, Para virtualization, VMware, Full Virtualization, Microsoft Hyper-V.

UNIT-II: CLOUD COMPUTING OVERVIEW   **(Periods:12)**
Cloud computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Pros and Cons of cloud, Challenges ahead, Historical Developments, Building Cloud Computing Environments, Computing Platforms and Technologies

CLOUD COMPUTING ARCHITECTURE
Cloud Reference Model, Types of Clouds, Economics of the Cloud, Open Challenges.

UNIT- III: DATA INTENSIVE COMPUTING: MAP-REDUCE PROGRAMMING   **(Periods:10)**
Data-Intensive Computing, Technologies for Data-Intensive Computing, Aneka Map Reduce Programming.

UNIT-IV: CLOUD TECHNOLOGIES   **(Periods:10)**
Amazon Web Services- Compute Services, Storage Services, Communication Services, Additional Services, **Google AppEngine** -Architecture and Core Concepts, Application Life-Cycle, **Microsoft Azure-**Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance.

UNIT-V: CLOUD APPLICATIONS: (Periods:13)
Scientific Applications, Business and Consumer Applications
ADVANCED TOPICS IN CLOUD COMPUTING-Energy Efficiency in Clouds, Market Based Management of Clouds, InterCloud.

Total Periods:58

TEXT BOOKS:
1. Raj Kumar Buyya, Christian Vecchiola, S.Thamarai Selvi, *"Mastering Cloud Computing,"* Tata McGraw Hill ,New Delhi,2013.
2. Ivanka Menken, Gerard Blokdijk, *"Cloud Computing Specialist Certification Kit – Virtualization, The Art of Service,"* Emereo Pty Ltd, 2009.

REFERENCE BOOKS:
1. Michael Miller, *"Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online,"* Que Publishing, Pearson, August 2011.
2. George Reese, *"Cloud Application Architectures Building Applications and Infrastructure in the Cloud,"* O'Reilly Media Released, April 2009.
3. Gautham Shroff, *"Enterprise Cloud Computing: Technology, Architecture, Application,"* Cambridge University Press, 2010.
4. Barrie Sosinky, *"Cloud Computing Bible"*, Wiley Publishing Inc, 2011.

M. Tech. (CS) – II Semester
(14MT20521) SEMINAR

INT. MARKS	EXT. MARKS	TOTAL MARKS		L	T	P	C
--	50	50		--	--	--	2

PRE-REQUISITES: --

COURSE DESCRIPTION:
Identification of seminar topic; Literature survey; Preparation of technical report and Presentation

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Acquire in-depth knowledge in core and allied areas of interest.

CO2. Analyze and synthesize information related to the areas.

CO3. Conceptualize and construct research problems.

CO4. Extract information pertinent to a specific area through literature survey to conduct research.

CO5. Identify the applicability of modern software and tools.

CO6. Contribute positively to multidisciplinary groups in emerging areas with objectivity and rational analysis.

CO7. Plan, organize, prepare and present effective written and oral technical reports.

CO8. Engage in lifelong learning to improve competence.

CO9. Acquire awareness on professional code of conduct in the chosen area.

CO10. Develop independent and reflective learning.

M. Tech. (CS)-II Semester
(14MT20522) WEB PROGRAMMING AND OOAD LAB

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
25	50	75		-	-	4	2

PREREQUISITES: *Courses on* "Web Programming" and "Object Oriented Programming".

COURSE DESCRIPTION

Develop and implement dynamic web applications on contemporary and social issues using HTML, CSS, JS and PHP technologies.

Hands on practice in using Visual Modeling Tools and design real time case studies such as Automated Teller Machine (ATM), Online Ticket Reservation for Railways, A Point-of-Sale (POS) System, A Multi-Threaded Airport Simulation, Hospital Management System, Unified Library Application, and Online Shopping.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

CO1. To apply knowledge of UML to design an object-oriented system

CO2. Gain knowledge in designing web pages using HTML, CSS, JS.

CO3. Analyze XML files using DTD parser.

CO4. Use Dreamweaver and Notepad++ for designing web pages and generating dynamic content.

CO5. Develop websites for self development and for promoting awareness among the community in societal and Environmental issues

CO6. Engage in lifelong learning by incorporating the best design practices.

OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY EXERCISES:

Draw the UML diagrams for the following case studies:

OOAD Tool to be used: Rational Rose, visual paradigm

Operating System: windows XP

Case Study No: 1

Problem Title: Automated Teller Machine (ATM)

Problem Statement:

Software is designed for supporting a computerized ATM banking network. All the process involved in the bank is computerized these days. All the accounts maintained in the bank and also the transactions effected, including ATM transactions are to be processed by the computers in the bank. An ATM accepts a relevant cash card, interacts with user, communicates with the central system to carry out the transaction, dispenses cash, and prints receipts. The system to be designed and implemented must include appropriate record keeping and security provisions. The system must handle concurrent access to the same account.

Case Study No: 2
Problem Title: Online Ticket Reservation for Railways
Problem Statement:
Computer play an integral part of the day in today's life. It makes the entire job easier and faster, every job is computerized so as the ticket reservation we can book over the online ticket reservation system. During the booking of the ticket reservation passenger has to select origin, data of journey, destination, class of train etc. The reservation counter keeps track of passenger's information. Thus the system will have all the details about the trains and facilities provided by them. There are various trains with the different level of convenience for the passengers. The whole database will be maintained by database administrator. There are varieties of trains where the passengers can select the train according to the convenience for their destination journey. The journey could be within the state or across the India. Each train has the three types of classes ie Sleeper class, First class and the AC compartment. Design the application for the above problem description.

Case Study No: 3
Problem Title: A Point-of-Sale (POS) System
Problem Statement:
A POS system is a computerized application used to record sales and handle payments, it is typically used in a retail store, it includes hardware components such as a computer and bar code scanner, and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant, that is, even if remote services are temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client-side terminals and interfaces such as browser, PDA's, touch-screens.

Case Study No: 4
Problem Title: A Multi-Threaded Airport Simulation
Problem Statement: Simulate the operations in an airport. Your application should multiple aircrafts using several runways and gates avoiding collisions/conflicts. Loading: an aircraft uses the runway, lands, and then taxis over to the terminal. Take-Off an aircraft taxies to the runway and then takes off.

Case Study No: 5
Problem Title: Hospital Management System
Problem Statement:
Hospital Management System (HMS) is state-of-the-art software that offers comprehensive solutions to various segments of Healthcare Industry such as Super Specialty, Multi-specialty and General Hospitals of varied capacities, small Nursing Homes, HMOs, Polyclinics and General Practitioners. This HMS solution addresses the issues from multi-discipline angels namely Patients, Doctors, Pharmacy, Hospital Management and Services.

The Software provides both clinical as well as patient care aspects to hospital management. The software is divided into different modules, each addressing a specific activity of the hospital and there by facilitating better patient care. Each module can be used as a standalone solution or can be integrated in a phased manner. Modules are designed so that they meet the present and

future requirements of the hospital. HMS offers various sub-systems and a seamless integration. By being modular, each module can be used as a standalone solution or can be integrated in a phased manner. Modules are also so designed to meet the present as well as future requirements of the organization and process a unique ability with the business growth.HMS consists of the Base modules, Add-on modules and Specialty modules. Additional modules both add-on and specialty modules can be seamlessly integrated to the HMS at any time. The Integration Manager takes care of all the data consistency issues.

Case Study No: 6

Problem Title: Unified Library Application

Problem Statement:

A library lends books and magazines to members, who are registered in the system. Also it handles the purchase of new titles for the library. Popular titles are bought in multiple copies. A member can reserve a book or magazine that is not currently available in the library, so that when it is returned by the library that person is notified. The library can easily create, update and delete information about the titles, members, loans and reservations in the systems.

Base Modules:

- Appointments , Registration, Consultation (OP),Ward Management(IP), Billing and Accounts,
- Packages and Health Plans , Corporate and Insurance, Electronic Medical Records, Services (Test/Results)

Case Study No: 7

Problem Title: Online Shopping

Problem Statement:

A POS System is a computerized application used to record sales and handle payments; it is typically used in a retail store. It includes hardware components such as a computer and bar code scanner, and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services and temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client – side terminals and interfaces such as browser, PDAs, touch screens.

WEB PROGRAMMING LABORATORY EXERCISES:

1. Create an HTML web page with at least the following features:
   Keywords & description meta tags, title, Page formatting, including a background color *and* picture, a non-default text color, and non-default text and link colors, A horizontal rule, At least three levels of headers, Text formatting, including specifying a non-default font as well as centered, bold, italics, subscript, superscript, and strikeout, A three-level bulleted list and a two-level numbered list, At least two external links, with one a text link and one an image link, Three internal "bookmark" links – that is, a link to further down on the current page, A relative link to an image in a different directory than the directory in which your current HTML page resides, An image with a non-standard-width border in a non-standard color. The image should appear off to the right side of the page, an image map with at least three links, a table that includes at

least three rows, two cells in each row, two cols pan attributes, and one row span attribute. Put a background color on the entire table, a different background color on one cell, and a background image on one entire row of the table.

2. Create an HTML web page with JavaScript for the following problem:
Get two input numbers from an HTML form. On submit, call a function to edit them to make sure that they are within the range of 1-100. If not, display an error message and set focus to the field in error. If the entered numbers are valid, add the two numbers together and display the total in an alert box. Pop up a prompt box to get a third number and edit it to make sure it's in the range of 1 to 5. Multiply the original total (from the two input boxes) by this third number. Store the result in a cookie and then automatically open a second page to display the cookie that you saved on the prior page.

3.
   a. Write an XML file which will display the Book information which includes the following:
      1) Title of the book   2) Author Name   3) ISBN number
      4) Publisher name   5) Edition   6) Price
   b. Write a Document Type Definition (DTD) to validate the above XML file. Display the XML file as follows:
      The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns. Use XML schemas XSL and CSS for the above purpose. Note: Give at least for 4 books. It should be valid syntactically. Hint: You can use some xml editors like XML-spy.

4. Write PHP Script to demonstrate
   a.   String processing in PHP
   b.   File uploading
   c.   Sessions and Cookies

5. Write PHP Script that takes user input data (Personal Information like registration to a website) in a form and validates it and write the data into the database.

M. Tech. (CS) – III & IV Semesters
(14MT30521 and 14MT40521) PROJECT WORK

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
80	120	200		--	--	--	16

PRE-REQUISITES: --

COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Acquire in-depth knowledge in the areas of interest.

CO2. Analyse critically chosen project topic for conducting research.

CO3. Apply knowledge gained through Program, self learning and experience for solution of a given problem efficiently.

CO4. Undertake research confidently in the project domain.

CO5. Use the techniques, skills and modern engineering tools necessary for project work.

CO6. Perform harmonically in multi-disciplinary, multi-cultural groups, and develop a high level of interpersonal skills.

CO7. Manage projects in respective disciplines and multidisciplinary environments with due consideration to cost and time efficiency.

CO8. Develop communication skills, both oral and written for preparing and presenting reports.

CO9. Engage in lifelong learning to improve knowledge and competence continuously.

CO10. Understand professional and ethical responsibility for sustainable development of society.

CO11. Develop independent and reflective learning.