

DEPARTMENT OF INFORMATION TECHNOLOGY

M.TECH (INFORMATION TECHNOLOGY)

Scheme of Instruction and Examination

(Regulation:R16)

(with effect from **2016-2017** admitted batch onwards)

I – SEMESTER

Code No.	Course title	Credits	Lecture Hrs	Lab Hrs	Total Contact Hrs/Week	Sessional Marks	Exam Marks	Total Marks
M16 CST 1101	Mathematical Foundations of Computer Science	4	4	--	4	30	70	100
M16 CST 1102	Data Structures & Algorithms	4	4	--	4	30	70	100
M16 CST 1103	Advanced Data Base Management Systems	4	4	--	4	30	70	100
M16 CST 1104	Advanced Operating Systems	4	4	--	4	30	70	100
#1	Elective-I	4	4	--	4	30	70	100
#2	Elective-II	4	4	--	4	30	70	100
M16 CST 1113	Data Structures & Programming Lab	2	--	3	3	50	50	100
M16 CST 1114	Database Management Systems Lab	2	--	3	3	50	50	100
Total		28	24	6	30	280	520	800

	Course Code	Course
#1-Elective-I	M16 IT 1101	Computer Organization & Architecture
	M16 IT 1102	E-Commerce
	M16 IT 1103	Embedded Systems
	M16 IT 1104	Image Processing
	M16 IT 1105	Artificial Intelligence
	M16 IT 1106	Compiler Design
#2-Elective-II	M16 IT 1107	Computer Networks
	M16 IT 1108	Cloud Computing
	M16 IT 1109	Grid Computing
	M16 IT 1110	Computer Graphics & Visual Computing
	M16 IT 1111	Parallel Programming
	M16 IT 1112	Computer Vision

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common for M.Tech (CST, IT))

Theory	: 4 Periods	Sessionals	: 30
Exam	: 3 Hrs.	Ext. Marks	: 70
		Credits	: 4

COURSE OBJECTIVES:

1. Presenting the theory of finite automata, as the first step towards learning advanced topics, such as compiler design.
2. Applying the concepts learned in fundamental courses such as Discrete Mathematics, in a theoretical setting; in particular, the application of proof techniques.
3. Discussing the applications of finite automata towards text processing.
4. Developing an understanding of computation through Turing Machines

COURSE OUTCOMES:

1. Critical, logical-mathematical reasoning
2. Ability to apply mathematical knowledge and logic in solving problems.
3. Understanding of formal grammar analysis and compilation.

SYLLABUS

Mathematical notions of sets, sequences and tuples, functions and relations, Primitive recursive functions, computable functions, examples, graphs, strings and languages.

Boolean logic – properties and representation, theorems and types of proofs, deductive, inductive, by construction, contradiction and counter-examples.

Introduction to Number theory, Divisibility, modular arithmetic (addition modulo and multiplication modulo); Statements and applications of Euler and Fermat Theorems, Primitive Roots, Discrete Logarithms, Primality Test, Finding Large primes, Definition of Elliptic Curves and their applications to Cryptography.

Introduction To Finite Automata: Alphabets and languages- Deterministic Finite Automata – Non- deterministic Finite Automata – Equivalence of Deterministic and Non-Finite Automata – Languages Accepted by Finite Automata – Finite Automata and Regular Expressions – Properties of Regular sets &Regular Languages and their applications.

Context Free Languages: Context –Free Grammar – Regular Languages and Context-Free Grammar – Pushdown Automata – Pushdown Automata and Context-Free Grammar – Properties of Context-Free Languages – pushdown automata and Equivalence with Context Free Grammars.

Turing Machines: The Definition of Turing Machine – Computing with Turing Machines – Combining Turing Machines, , programming techniques for Turing Machines.

Variants of Turing Machines, Restricted Turing Machines Universal Turing Machines. The Halting Problem, Decidable & undecidable problems- Post Correspondence Problems

TEXT BOOKS:

1. Introduction to Automata Theory, Languages and Computations – J.E. Hopcroft, & J.D. Ullman, Pearson Education Asia.
2. Cryptography and Network Security, William Stallings.(Second Edition)Pearson Education Asia.

REFERENCE BOOKS:

1. Introduction to languages and theory of computation – John C. Martin (MGH)
2. Discrete Mathematical structures with application to Computer Science – J.P. Tremblay and R. Manohar, Mcgraw Hill Education
3. Introduction to Theory of Computation – Michael Sipser (Thomson Nrools/Cole)
4. Cryptanalysis of number theoretic Cyphers, Samuel S. Wagstaff Jr. Champan & Hall/CRC Press 2003.
5. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes –Ousley, Keith Strassberg Tata McGraw-Hill.

DATA STRUCTURES & ALGORITHMS

(Common for M.Tech (CST, IT))

Theory	: 4 Periods	Sessionals	: 30
Exam	: 3 Hrs.	Ext. Marks	: 70
		Credits	: 4

COURSE OBJECTIVES:

1. Student will learn about advanced data structures and the algorithms for manipulating them, and how to analyze the time and memory requirements of them.
2. Student will master some complex searching and sorting algorithms and their data structures, advanced types of trees, basic computational geometry procedures, and graph representations and graph algorithms.
3. Student will learn when and how to use techniques for developing algorithms, such as divide-and-conquer and dynamic programming.
4. Student will also become skilled in algorithmic analysis and algorithm development using the latest techniques.

COURSE OUTCOMES:

1. Be able to write programs and class libraries given a specification;
2. Implement various data structures.
3. Implement and analyze various sorting algorithms.
4. Understand abstract data types and how they are implemented in 'C' programming language.

SYLLABUS

Algorithm Analysis: Overview of C++ classes, pointers, parameters passing, templates, using Matrices, Basics of time complexity estimates, General norms for running time calculation

Lists, Stacks & Queues: Abstract Data Types, Representation & implementation of ADT list, Doubly linked list, Circular linked lists, Representation, Implementation and applications of ADT stack and Queue.

Trees: Implementation and traversal of trees, Binary Trees and Binary search trees in C++, Concepts of AVL Trees, Splay Trees and B-Trees.

Hashing: Hash Function, Separate chains, Open addressing, rehashing, Extendible Hashing.

Internal Sorting Algorithms: Sorting like insertion Sort, shell Sort, Heap Sort, Merge Sort, Quick Sort and Simple external Sorting algorithm.

Disjoint Set: Equivalence Relations, Find and Union algorithms an dynamic sets, Path compression and Union-by-Rank algorithm analysis.

Graph Algorithms: Representation of graph Topological Sort, shortest-path Algorithm, Network flow problem, Minimum spanning tree algorithm, Applications of Depth – First search, Introduction to NP-Completeness.

TEXT BOOK:

1. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss. Second edition, Pearson Edition. Asia.

REFERENCE BOOKS:

1. Data Structures & Algorithm in C++, Adam Drozdek. Vikas publication House.
2. Data Structure, Algorithm and OOP, Gregory L. Heileman (Tata Mc Graw Hill Edition).
3. Data Structures, Algorithms and Applications in C++, Sartaj Sahni, Mc Graw-Hill International Edition.

ADVANCED DATA BASE MANAGEMENT SYSTEMS
(Common for M.Tech (CST, IT))

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To interpret an entity relationship diagram (ERD) to express requirements and demonstrate skills to model data requirements and create data models into normalized designs
2. To use SQL to create database objects, populate tables, and retrieve data
3. To describe the causes of performance problems and how to improve database application performance
4. To develop a working understanding of database systems theory in order to apply that knowledge to any particular database implementation.

COURSE OUTCOMES:

1. Understanding of DBMS.
2. Design database using ER model and refine the design by enforcing functional dependencies, integrity constraints and normalization
3. Write queries using SQL
4. Implement procedures and triggers

SYLLABUS

Database Systems: Introduction to the Database Systems, Concepts of Relational Models and Relational Algebra. SQL: Introduction to SQL Queries, Integrity Constraints, Joins, Views, Intermediate and Advanced SQL features and Triggers.

Database Design: Overview of the Design process, E-R Models, Functional dependencies and other kinds of dependencies, Normal forms, Normalization and Schema Refinement.

Database Application Design and Development: User Interfaces and Tools, Embedded SQL, Dynamic SQL, Cursors and Stored procedures, JDBC, Security and Authorization in SQL, Internet Applications.

Query Evaluation: Overview, Query processing, Query optimization, Performance Tuning.

Database System Architectures: Centralized and Client-Server Architecture, Server system Architecture, Parallel and Distributed database, Object based databases and XML. Advanced data types in databases. Cloud based data storage systems.

Transaction Management: Overview of Transaction Management, Transactions, Concurrency control, Recovery systems, Advanced Transaction Processing.

Case Studies: Postgre SQL, Oracle, IBM DB2 Universal Database, Microsoft SQL Server.

TEXT BOOKS:

1. Database System Concepts, Avi Silberschatz, Henry F. Korth, S. Sudarshan McGraw-Hill, Sixth Edition, ISBN 0-07-352332-1.

REFERENCE BOOKS:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw-Hill.

ADVANCED OPERATING SYSTEMS
(Common for M.Tech (CST, IT))

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To understand the concepts of distributed systems
2. To know networks and protocols, RPC
3. To understand Synchronization, Process and Processors, File and Directory Services, shared memory in Distributed systems

COURSE OUTCOMES:

Students understands the concept of Distributed systems, Process Synchronization, File structure and shared memory in Distributes operating systems

SYLLABUS

Introduction To Operating Systems, Types Of Operating Systems, Operating System Structures. Operating-System Services, System Calls, Virtual Machines, Operating System Design And Implementation.

Process Management: Process Concepts, Operations On Processes, Cooperating Processes, Threads, Inter Process Communication, Process Scheduling, Scheduling Algorithms, Multiple -Processor Scheduling. Thread Scheduling.

Process Synchronization & Deadlocks: The Critical Section Problem, Semaphores, And Classical Problems Of Synchronization, Critical Regions, Monitors, Deadlocks,-System Model, Deadlocks Characterization, Methods For Handling Deadlocks, Deadlock-Prevention, Avoidance, Detection,& Recovery from Deadlocks.

Memory Management & File System Implementation: Logical Versus Physical Address Space, Paging And Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing, File System Implementation -Access Methods, Directory Structure, Protection, File System Structure, Allocation Methods, Free Space Management, Directory Management, Device Drivers

Distributed Operating Systems: Distributed System Goals, Types Of Distributed Systems, Styles & Architecture Of Distributed Systems, Threads, Virtualization, Clients, Servers, Code Migration, and Communication in Distributed Systems.

Distributed Systems & Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning Of Nodes, Data-Centric Consistency Models, Client-Centric Consistency Models, Consistency Protocols.

Fault Tolerance, Security: Introduction To Fault Tolerance, Process Resilience,, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery, Secure Channels, Access Control, Security Management.

TEXT BOOKS:

1. Silberschatz & Galvin, 'Operating System Concepts', Wiley.
2. "DISTRIBUTED SYSTEMS", Second edition, Andrew S.Tanenbaum, Maarten Van teen, Pearson

REFERENCE BOOKS:

1. William Stallings-"Operating Systems"- 5th Edition - PHI
2. Charles Crowley, 'Operating Systems: A Design-Oriented Approach', Tata Hill Co., 1998 edition.
3. Andrew S. Tanenbaum, 'Modern Operating Systems', 2nd edition, 1995, PHI.

COMPUTER ORGANIZATION AND ARCHITECTURE

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

Understand the architecture of a modern computer with its various processing units. Also the performance measurement of the computer system. In addition to this the memory management system of computer.

COURSE OUTCOMES:

1. Students can understand the architecture of modern computer.
2. They can analyze the Performance of a computer using performance equation
3. Understanding of different instruction types.
4. Students can calculate the effective address of an operand by addressing modes
5. They can understand how computer stores positive and negative numbers.
6. Understanding of how a computer performs arithmetic operation of positive and negative numbers.
7. Understanding of how computer stores floating point numbers in IEEE 754 standard.
8. Cache memory and its importance.
9. Students can understand how cache mapping occurs in computer and can solve various problems related to this.
10. Secondary storage organization and problem solving

SYLLABUS**Register Transfer and Micro operations:**

Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit.

Basic Computer Organization and Design:

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.

Micro programmed Control:

Control Memory, Address Sequencing, Micro program Example, Design of Control Unit.

Central Processing Unit:

Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer(RISC)

Input/output Organization:

Peripheral Devices, I/O interface, Asynchronous data transfer, Modes of transfer, priority Interrupt, Direct memory access, Input-Output Processor (IOP), Serial Communication.

Memory Organization:

Memory Hierarchy, Main memory, Auxiliary memory, Associate Memory, Cache Memory, and Virtual memory, Memory Management Hardware.

Overview of Computer Architecture:

Evolution of Computer Systems, Parallelism in Uni- processor System, Parallel Computer Structures, Architectural Classification Schemes, Parallel Processing Applications.

TEXT BOOKS:

1. Computer System Architecture, M. Morris Mano, Prentice Hall of India Pvt. Ltd., Third Edition, Sept. 2008 .
2. Computer Architecture and Parallel Processing, Kai Hwang and Faye A. Briggs, McGraw Hill, International Edition 1985.

REFERENCE BOOKS:

1. Computer Architecture and Organization, William Stallings, PHI Pvt. Ltd., Eastern Economy Edition, Sixth Edition, 2003.
2. "Computer System Architecture", John. P. Hayes.
3. Computer Architecture A quantitative approach 3rd edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elsevier).

E-COMMERCE

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To understand process models
2. E - payments
3. Credit Cards smart cards
4. E - documents
5. E - Business logic

COURSE OUTCOMES:

1. Student able to understand advertising, marketing process on the internet and be familiar with the e-commerce services

SYLLABUS

Introduction: Electronic Commerce-Frame Work, Anatomy of E-Commerce Applications, E-Commerce Consumer Applications, E-Commerce Organization Applications. Consumer Oriented Electronic Commerce - Mercantile Process Models, Digital Economy and e-business Models

Electronic Payment Systems – Types of Electronic Payment Systems, Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment Systems, Designing Electronic Payment Systems Electronic Data Inter Change, Inter Organizational Commerce - EDI, EDI Implementation, Value Added Networks.

Intra Organizational Commerce, Macro Forces and Internal Commerce, Work Flow Automation and Coordination, Customization and Internal Commerce, Supply Chain Management. Business Cases for Document Library, Digital Document Types, Corporate Data Ware-Houses.

Advertising And Marketing: Information Based Marketing, Advertising On Internet, Online Marketing Process, Market Research. Consumer Search and Resource Discovery, Information Search and Retrieval, Commerce Catalogues, Information Filtering.

Multimedia-Key Multimedia Concepts, Digital Video and Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.

Business to consumer e-commerce: On line Marketing and Selling, Information Goods, Electronic Markets and Auctions on the Internet

E-Business Intelligence: Data Mining, Web Merchandising and Recommender Systems, Intelligent Agents in e-commerce, Business-to-Business e-commerce and Supply Chain Management

Security of Internet Hosts and Networks, Public Key Infrastructure, Safety of e-commerce Applications

TEXT BOOKS:

1. Frontiers of Electronic Commerce, Kalakata and Whinston, Pearson.

REFERENCE BOOKS:

1. E-Commerce fundamentals and Applications, Hendry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang, John Wiley.
2. E-Commerce, S.Jaiswal, Galgotia.
3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.
4. E-Commerce - Business, Technology and Society, Kenneth C.Taudon, Carol Guyerico Traver.

EMBEDDED SYSTEMS

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To understand the architecture embedded systems
2. To know Embedded system software design
3. Design, execution and evaluation of experiments on embedded platforms.
4. Analysis, design and testing of systems that include both hardware and software. Identification and synthesis of solutions for embedded system problems

COURSE OUTCOMES:

1. An ability to design systems, components, or processes for broadly-defined engineering technology problems.
2. Implement combinatorial logic and sequential systems in terms of basic digital building blocks using simulation software. You will be able to perform some optimisations.
3. Design, test and critically evaluate embedded solutions to real world situations using digital components (sequential and combinatorial).
4. Recognize the key features of embedded systems in terms of computer hardware and be able to discuss their functions. You will be aware of the key factors affecting computing hardware evolution.
5. Develop software systems for embedded devices using assembler code

SYLLABUS

Examples of Embedded Systems – Typical Hardware – Memory – Microprocessors – Busses – Direct Memory Access – Introduction to 8051 Microcontroller – Architecture-Instruction set – Programming.

Microprocessor Architecture – Interrupt Basics – The Shared-Data problem – Interrupt Latency.

Round-Robin Architecture - Round-Robin with Interrupts Architecture - Function-Queue-Scheduling Architecture – Real-Time Operating Systems Architecture – Selection of Architecture.

Tasks and Task States – Tasks and Data – Semaphores and Shared Data – Semaphore Problems – Semaphore variants.

Message Queues – Mailboxes – Pipes – Timer Functions – Events – Memory Management – Interrupt Routines in RTOS Environment.

RTOS design – Principles – Encapsulation Semaphores and Queues – Hard Real-Time Scheduling Considerations – Saving Memory Space – Saving Power.

Host and Target Machines – Linker/Locator for Embedded Software- Getting Embedded Software into the Target System.

Testing on your Host Machine – Instruction Set Simulators – Laboratory Tools used for Debugging.

TEXT BOOKS:

1. The 8051 Microcontroller Architecture, Programming & Applications, Kenneth J. Ayala, Penram International.
2. An Embedded Software Primer, David E. Simon, Pearson Education , 2005.

REFERENCE BOOK:

1. Embedded Systems: Architecture , Programming and Design, Raj Kamal, Tata McGraw-Hill Education, 2008

IMAGE PROCESSING

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. The course objectives include: overview of digital image processing field; understand the fundamental digital image processing algorithms and implementation; gain experience in applying image processing algorithms to real problems.
2. Cover the basic theory and algorithms that are widely used in digital image processing
3. Expose students to current technologies and issues that are specific to image processing systems

COURSE OUTCOMES:

1. Demonstrated understanding of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.
2. Demonstrated understanding of spatial filtering techniques, including linear and nonlinear methods.
3. Demonstrated understanding of 2D Fourier transform concepts, including the 2D DFT and FFT, and their use in frequency domain filtering.
4. Demonstrated understanding of the fundamental image enhancement algorithms such as histogram modification, contrast manipulation, and edge detection.

SYLLABUS

Fundamentals of Image Processing: Image Acquisition, Image Model, Sampling, Quantization, Relationship between Pixels, Distance Measures, Connectivity, Image Geometry, Photographic Film. Histogram: Definition, Decision Of Contrast Basing On Histogram, Operations Basing on Histograms Like Image Stretching, Image Sliding, Image Classification. Definition and Algorithm of Histogram Equalization.

Image Transforms: A Detail Discussion On Fourier Transform, DFT,FFT, Properties WALSH Trans Form , WFT, HADAMARD Transform, DCT.

Image Enhancement:

- a. Arithmetic and Logical Operations, Pixel or Point Operations, Size Operations,
- b. Smoothing Filters-Mean, Median, Mode Filters – Comparative Study
- c. Edge Enhancement Filters – Directorial Filters, Sobel, Laplacian, Robert, KIRSCH Homogeneity
- d. & DIFF Filters, Prewitt Filter, Contrast Based Edge Enhancement Techniques – Comparative Study
- e. Low Pass Filters, High Pass Filters, Sharpening Filters. – Comparative Study
- f. Colour Fundamentals and Colour Models
- g. Colour Image Processing.

Image Enhancement: Design of Low Pass, High Pass, EDGE Enhancement, Smoothing Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters in Frequency Domain Advantages of Filters in Frequency Domain, Comparative Study of Filters in Frequency, Domain and Spatial Domain.

Image Compression: Run Length Encoding, Contour Coding, Huffman Code, Compression Due to Change in Domain, Compression Due to Quantization Compression at the Time of Image Transmission. Brief Discussion on:- Image Compression Standards.

Image Segmentation: Characteristics of Segmentation, Detection of Discontinuities, Thresholding Pixel Based Segmentation Method. Region Based Segmentation Methods, Segmentation by Pixel Aggregation, Segmentation by Sub Region Aggregation, Histogram Based Segmentation, Spilt and Merge Technique, Motion in Segmentation

Morphology: Dilation, Erosion, Opening, Closing, Hit-And-Miss Transform, Boundary Extraction, Region Filling, Connected Components, Thinning, Thickening, Skeletons , Pruning Extensions to Gray – Scale Images Application of Morphology in I.P

Image , Video & Multimedia Communications: Multi-scale and multi-orientation representation; Geometry and texture representation; Object based representation; Hierarchical representation; Sparse representation, Multimedia with image and video content; Multimedia event synchronization.

TEXT BOOK:

1. Digital Image Processing, Rafael C. Gonzalez And Richard E. Woods, Addison Wesley

REFERENCE BOOKS:

1. Fundamentals Of Electronic Image Processing By Arthyr – R – Weeks, Jr.(PHI)
2. Image Processing, Analysis, and Machine Vision by Milan Sonka Vaclan Halavac Roger Boyle, Vikas Publishing House.
3. Digital Image Processing, S. Jayaraman, S. Esakkirajan& T. Veera Kumar, TMH
4. Fundamentals of Digital Image Processing, Chris Solomon, Tobi Breckon, Wiley-Blackwell

ARTIFICIAL INTELLIGENCE

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To introduce different artificial intelligence techniques
2. To learn different machine learning algorithms
3. Learn different recent algorithms in artificial intelligence

COURSE OUTCOMES:

1. Able to learn artificial intelligence techniques
2. Understand the concept of machine learning.

SYLLABUS

Introduction: Artificial Intelligence, AI Problems, AI Techniques, the Level of the Model, Criteria for Success. Defining the Problem as a State Space Search, Problem Characteristics, Production Systems, Search: Issues in The Design of Search Programs, Un-Informed Search, BFS, DFS; Heuristic Search Techniques: Generate-And- Test, Hill Climbing, Best-First Search, A* Algorithm, Problem Reduction, AO*Algorithm, Constraint Satisfaction, Means-Ends Analysis.

Knowledge Representation: Procedural Vs Declarative Knowledge, Representations & Approaches to Knowledge Representation, Forward Vs Backward Reasoning, Matching Techniques, Partial Matching, Fuzzy Matching Algorithms and RETE Matching Algorithms; Logic Based Programming- AI Programming languages: Overview of LISP, Search Strategies in LISP, Pattern matching in LISP , An Expert system Shell in LISP, Over view of Prolog, Production System using Prolog

Symbolic Logic: Propositional Logic, First Order Predicate Logic: Representing Instance and is-a Relationships, Computable Functions and Predicates, Syntax & Semantics of FOPL, Normal Forms, Unification &Resolution, Representation Using Rules, Natural Deduction; Structured Representations of Knowledge: Semantic Nets, Partitioned Semantic Nets, Frames, Conceptual Dependency, Conceptual Graphs, Scripts, CYC;.

Reasoning under Uncertainty: Introduction to Non-Monotonic Reasoning, Truth Maintenance Systems, Logics for Non-Monotonic Reasoning, Model and Temporal Logics; Statistical Reasoning: Bayes Theorem, Certainty Factors and Rule-Based Systems, Bayesian Probabilistic Inference, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic: Crisp Sets ,Fuzzy Sets, Fuzzy Logic Control, Fuzzy Inferences & Fuzzy Systems.

Experts Systems: Overview of an Expert System, Structure of an Expert Systems, Different Types of Expert Systems- Rule Based, Model Based, Case Based and Hybrid Expert Systems, Knowledge Acquisition and Validation Techniques, Black Board Architecture, Knowledge Building System Tools, Expert System Shells, Fuzzy Expert systems.

Machine Learning: Knowledge and Learning, Learning by Advise, Examples, Learning in problem Solving, Symbol Based Learning, Explanation Based Learning, Version Space, ID3 Decision Based Induction Algorithm, Unsupervised Learning, Reinforcement Learning, Supervised Learning: Perceptron Learning, Back propagation Learning, Competitive Learning, Hebbian Learning.

Natural Language Processing: Role of Knowledge in Language Understanding, Approaches Natural Language Understanding, Steps in The Natural Language Processing, Syntactic Processing and Augmented Transition Nets, Semantic Analysis, NLP Understanding Systems; Planning: Components of a Planning System, Goal Stack Planning, Hierarchical Planning, Reactive Systems

TEXT BOOKS:

1. Artificial Intelligence, George F Luger, Pearson Education Publications
2. Artificial Intelligence, Elaine Rich and Knight, Mcgraw-Hill Publications

REFERENCE BOOKS:

1. Introduction To Artificial Intelligence & Expert Systems, Patterson, PHI
2. Multi Agent systems- a modern approach to Distributed Artificial intelligence, Weiss.G, MIT Press.
3. Artificial Intelligence : A modern Approach, Russell and Norvig, Printice Hall

COMPILER DESIGN

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To learn the various system software like assemblers, loaders, linkers and macro.
2. To study the features of design phases and parsing techniques of a Compiler.
3. To learn the various techniques of syntax directed translation & code optimization.
4. To introduce the major concept areas of language translation and compiler design.
5. To enrich the knowledge in various phases of compiler and its use, code optimization techniques, machine code generation, and use of symbol table.
6. To extend the knowledge of parser by parsing LL parser and LR parser.

COURSE OUTCOMES:

1. To acquire the knowledge of modern compiler & its features.
2. To learn the new code optimization techniques to improve the performance of a program in terms of speed & space.
3. To use the knowledge of patterns, tokens & regular expressions

SYLLABUS

Introduction: Introduction to Compilers and Language processors, Programming Language basics, Extended Backus- Naur Form Syntax Notation, Applications of Compiler Technology, Design of New Computer Architecture, Structure & Different Phases of a Compiler, Review of Compiler Structure, Structure of Optimizing Compilation.

Finite Automata & Lexical Analysis: introduction to Lexical Analysis, Lexical Analyzers, Approaches to design Lexical Analyzers, Language for specifying lexical analyzers, Introduction to Finite automata, Regular Expressions & Languages, Recognition of Tokens, Transition Diagrams, Look ahead Operator, Implementation of lexical analyzers, Lexical Analyzer Generator LEX.

Syntax Analysis: Syntactic Specification of Programming Languages, Context Free Grammars & Languages, Introduction to Parsers, Parser Generators, Yacc, Creating Yacc Lexical Analyzer with LEX, Basic Parsing Techniques: Shift Reduce Parsing, Operator Precedence Parsing, Top-down Parsing, Recursive Descent Parsing, Predictive Parsers, LR Parsers: SLR, LALR & Canonical LR parsing, Construction of Parse Tree, Error Recovery in Parsers.

Semantic Analysis: Semantic Actions, Syntax Directed Translations, Translation on the parse Tree, Implementation of Syntax Directed Translator, Intermediate Codes, Syntax Directed translation to Postfix code, Syntax Trees, Intermediate Code Generation, Three Address Code-Translation of Expressions, Type Checking & Type Conversions.

Code Optimization: Principal sources of Code Optimization, Loop Optimization, Basic Blocks & Flow Graphs, DAG Representation of Basic Blocks, Applications of DAG, Local Optimization, Unreachable Code Elimination, Dead Code Elimination, Data Flow Analysis, Data Flow Equations & Computations, Peep-Hole Optimization. Machine Dependent Optimizations, Overview of Informal Compiler Algorithm Notation (ICAN), If Simplification, Loop Simplification, Loop Inversion, Branch Optimization and Prediction,

Code Generation: Issues in Code Generation, Input to Code Generator, Instruction Selection, Register Allocation, Simple Target Machine Model, Program and Instruction Costs, Register allocation & Assignments, Code Generation Algorithm, Code Generators, Optimal Code Generation for Expressions, Code Generation From DAG.

Symbol Table Management, Contents of a Symbol Table, Data Structures for Symbol Tables; Run time Environments, Implementation of a simple Stack allocation, Heap Management, Block Structured Languages; Error Detection & Recovery, Lexical Phase Errors, Syntactic & Semantic Errors, Error Handling Routines.

Code Scheduling & Case Studies: Instruction Scheduling, Speculative Loads & Boosting, Speculative Scheduling, Software Pipe Lining, Trace Scheduling, Percolation Scheduling, Case Studies: Sun Compilers, SPARC, IBM XL Compiler for the POWER& Power PC , Digital Equipment Compiler for Alpha, Intel Reference Compilers, Future Trends In Compiler Design and Implementations.

TEXT BOOKS:

1. Principles of Compiler Design by Aho, D. Ullman, Lam and Ravi Sethi, Pearson Education Second Edition
2. Advanced Compiler Design and Implementation, Steven Muchnic, Elsevier Publications

REFERENCE BOOKS:

1. Compiler Construction by Kenneth. C. Louden, Vikas Pub. House.
2. Compiler Design, A.A. Pentambekar, Technical Publications
3. Modern Compiler Design, Grune.D, Van Reeuwijk K, Bal H.E, Jacobs C J H, Langendoen Springer.

COMPUTER NETWORKS

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

COURSE OUTCOMES:

After completing this course the student able to demonstrate the knowledge and ability to:

1. Independently understand basic computer network technology.
2. Identify the different types of network topologies and protocols.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
4. Identify the different types of network devices and their functions within a network
5. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

SYLLABUS

Introduction to Computer Networks: Introduction, Network Hardware, Network Software, Reference Models, Data Communication Services & Network Examples, Internet Based Applications.

Data Communications: Transmission Media, Wireless Transmission, Multiplexing, Switching, Transmission in ISDN, **Broad** Band ISDN , ATM Networks.

Data Link Control, Error Detection & Correction, Sliding Window Protocols, LANs & MANs: IEEE Standards for LANs & MANs-IEEE Standards 802.2, 802.3, 802.4, 802.5, 802.6, High Speed LANs.

Design Issues in Networks: Routing Algorithms, Congestion Control Algorithms, Net work Layer in the Internet, IP Protocol, IP Address, Subnets, and Internetworking.

Internet Transport Protocols: TRANSPORT Service, Elements of Transport Protocols, TCP and UDP Protocols, Quality of Service Model, Best Effort Model, Network Performance Issues.

Over View of DNS, SNMP, Electronic Mail, FTP, TFTP, BOOTP, HTTP Protocols, World Wide Web, Firewalls.

Network Devices: Over View of Repeaters, Bridges, Routers, Gateways, Multiprotocol Routers, Brouters, Hubs, Switches, Modems, Channel Service Unit CSU, Data Service Units DSU, NIC, Wireless Access Points, Transceivers, Firewalls, Proxies.

Advanced Concepts in Networks: Over View of Cellular Networks, Adhoc Networks, Mobile Adhoc Networks, Sensor Networks, Virtual Private Networks .Delay Tolerant Networks DTN, Ipv6,.

TEXT BOOK:

1. Computer Networks, Andrews S Tanenbaum,, Edition 5, PHI, ISBN:-81-203-1165-5

REFERENCE BOOKS:

1. Data Communications and Networking , Behrouz A Forouzan , Tata McGraw-Hill Co Ltd, Second Edition,
2. Computer networks, Mayank Dave, CENGAGE.
3. Computer networks, A System Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier.
4. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
5. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

CLOUD COMPUTING

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To impart fundamental concepts in the area of cloud computing
2. To impart knowledge in applications of cloud computing

COURSE OUTCOMES:

1. Understanding the systems, protocols and mechanisms to support cloud computing
2. Develop applications for cloud computing
3. Understanding the hardware necessary for cloud computing
4. Design and implement a novel cloud computing application

SYLLABUS

Cloud Computing Basics - Cloud Computing Overview, Applications, Intranets and the Cloud, First Movers in the Cloud. The Business Case for Going to the Cloud - Cloud Computing Services, Business Applications, Deleting Your Datacenter, Salesforce.com, Thomson Reuters.

Organization and Cloud Computing - When You Can Use Cloud Computing, Benefits, Limitations, Security Concerns, Regulatory Issues, Cloud Computing with the Titans - Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBMPartnerships.

Hardware and Infrastructure - Clients, Security, Network, Services. Accessing the Cloud - Platforms, Web Applications, Web APIs, Web Browsers. Cloud Storage - Overview, Cloud Storage Providers, Standards - Application, Client, Infrastructure, Service.

Software as a Service - Overview, Driving Forces, Company Offerings, Industries Software plus Services - Overview, Mobile Device Integration, Providers, Microsoft Online.

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, Case Study: McNeilus Steel.

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, Best Practices, How Cloud Computing Might Evolve.

TEXT BOOK:

1. Cloud Computing-A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGrawHill.

REFERENCE BOOK:

1. Mastering Cloud Computing- Raj Kumar Buyya, Christian Vecchiola and S.Tanurai Selvi, TMH, 2012

GRID COMPUTING

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. Understand the need for and evolution of Grids in the context of processor- and data-intensive applications
2. Be familiar with the fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery
3. Know architecture of grid computing
4. Be able to justify the applicability, or non-applicability, of Grid technologies for a specific application

COURSE OUTCOMES:

1. To understand the genesis of grid computing
2. To know the application of grid computing
3. To learn the technology and tool kits for facilitating grid computing

SYLLABUS

Introduction: Introduction to Parallel, Distributed Computing, Cluster Computing and Grid Computing, Characterization of Grids, Organizations and their Roles, Grid Computing Road Maps.

Architecture: Architecture of Grid and Grid Computing, Review of Web Services-OGSA-WSRF.

Grid Monitoring: Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- GridICE - JAMM -MDS-Network Weather Service-R-GMA-Other Monitoring Systems- Ganglia and GridM

Grid Middleware: List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and gLite - Architecture, Components and Features.

Data Management And Grid Portals: Data Management, Categories and Origins of Structured Data, Data Management Challenges, Architectural Approaches, Collective Data Management Services, Federation Services, Grid Portals, First-Generation Grid Portals, Second Generation Grid Portals.

Semantic Grid and Autonomic Computing: Meta data and Ontology in the Semantic Web, Semantic Web services, Layered structure of the Semantic Grid, Semantic Grid activities, Autonomic Computing

Grid Security and Resource Management: Grid Security, A Brief Security Primer, PKI-X509 Certificates, Grid Security, Scheduling and Resource Management, Scheduling Paradigms, Working principles of Scheduling , A Review of Condor, SGE, PBS and LSF-Grid Scheduling with QoS.

TEXT BOOKS:

1. Grid Computing, Joshy Joseph and Craig Fellenstein, Pearson Education 2004.
2. The Grid Core Technologies, Maozhen Li, Mark Baker, John Wiley and Sons , 2005.

REFERENCE BOOKS:

1. The Grid 2 - Blueprint for a New Computing Infrastructure, Ian Foster and Carl Kesselman, Morgan Kaufman - 2004.
2. Grid Computing: Making the Global Infrastructure a reality, Fran Berman, Geoffrey Fox, Anthony J.G. Hey, John Wiley and sons.

COMPUTER GRAPHICS & VISUAL COMPUTING

Theory	: 4 Periods	Sessionals	: 30
Exam	: 3 Hrs.	Ext. Marks	: 70
		Credits	: 4

COURSE OBJECTIVES:

1. To Learn basic and fundamental computer graphics techniques
2. To Learn image synthesis techniques
3. Examine applications of modeling, design and visualization
4. Learn different color modeling and computer animation
5. Learn hierarchical modeling and graphing file formats
6. Learn viewing pipeline and structures
7. To Learn visualization and computational and mathematical methods of visual computing
8. To understand visual transformation and projection

COURSE OUTCOMES:

Students able to

1. Learn basic and fundamental computer graphics techniques
2. Represent and implement images and objects using 3D representation.
3. Design develop surface detection using various detection methods
4. Choose various illumination models for provides effective standards of objects
5. Design of develop effective computer animations
6. Design of various projections

SYLLABUS

Introduction: Computer Graphics and their applications, Computer Aided Design-Computer Art, Entertainment, Education and Training, Graphical User Interfaces; Over view of Graphics systems: Video Display Devices, Raster Scan systems, random scan systems, Graphics monitors and workstations, Input devices, hard copy devices, GUI and Interactive Input Methods, Windows and Icons , Virtual Reality Environments, Graphics software

Output primitives: Points and Lines, , Line and Curve Attributes-Color and Gray scale levels Line Drawing Algorithms, Loading the Frame buffer, Line function, Circle Generating Algorithms, Ellipse Generating Algorithms, Other Curves, Parallel Curve Algorithms, Curve Functions , Pixel Addressing, Area Fill Attributes, Filled Area Primitives, Filled Area Functions, Cell Array, Character Generation, Character Attributes, Bundled Attributes, Inquiry Functions , Antialiasing

Three Dimensional Concepts and Object representations: 3D display methods-3D Graphics, Polygon Surfaces, Curved Lines and Surfaces, Quadratic Surfaces, Super Quadrics, Blobby Objects, Spline Representations , Cubic Spline methods, Bézier Curves and Surfaces, B Spline Curves and Surfaces.

Two & Three Dimensional Transformations: Two Dimensional Transformations: Basic Transformations, Matrix Representations, Homogeneous Coordinates, Composite Transformations, Other Transformations, Transformations between Coordinate Systems, Affine Transformations -, Transformation Functions-, Raster methods for Transformation
Three Dimensional Transformations: Translation-, Rotation, scaling, Other Transformations,

Composite Transformations , 3D Transformation Functions , Modeling and Coordinate Transformations,

Viewing Pipeline and structures : Viewing Coordinates, Projections , View Volumes, General Projection Transformations , Clipping-, Hardware Implementations , Concepts of Structures and Basic models, Editing , Hierarchical Modeling with Structures.

Visualization: Three Dimensional Viewing, Visualization- Image Processing- The viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-Viewport Coordinate Transformation, Two Dimensional Viewing Functions , Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping-Curve Clipping, Text and Exterior Clipping.

Visual Computing: Computational and mathematical methods for creating, capturing, analyzing and manipulating digital photographs, Introductory Topics on computer graphics, computer vision, and machine learning, Programming assignments intended to give hands-on experience with creating graphical user interfaces, and with implementing programs for synthesizing and manipulating photographs.

Visual Transformation & Projection: Graphics pipeline, perception and color models, camera models, transformations and projection, projections, lighting, shading, global illumination, texturing, sampling theorem, Fourier transforms, image representations, convolution, linear filtering, diffusion, nonlinear filtering, edge detection, optical flow, image and video compression, Creation of Visual Effects Optical Flow Video Compression, Radon Transform Texture.

TEXT BOOKS:

1. Computer Graphics C Version, Donald Hearn & M. Pauline Baker, Pearson Education, New Delhi, 2004
2. D. Forsyth and J. Ponce, Computer Vision: A Modern Approach, Prentice Hall Inc., 2003

REFERENCE BOOKS:

1. Procedural Elements for Computer Graphics, David F. Rogers, Tata McGraw Hill Book Company, New Delhi, 2003
2. Computer Graphics: Principles & Practice in C, J. D. Foley, S. K Feiner, A VanDam F. H John Pearson Education, 2004
3. Computer Graphics using Open GL, Francis S Hill Jr, Pearson Education, 2004.
4. Computer Vision and Image Processing: A Practical Approach using CVIPtools, S. E. Umbaugh,, Prentice Hall, 1998

PARALLEL PROGRAMMING

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To understand the scope, design and model of parallelism.
2. Know the parallel computing architecture.
3. Know the Characteristics, model and design of parallel algorithms.
4. Analytical modeling and performance of parallel programs.
5. Solve a complex problem with message passing model and programming with MPI.

COURSE OUTCOMES:

Students who complete this course successfully are expected to

1. Recall fundamental concepts of parallelism
2. Design and analyze the parallel algorithms for real world problems and implement them on available parallel computer systems.
3. Reconstruction of emerging parallel algorithms with MPI. Compute contemporary parallel algorithms.

SYLLABUS

Introduction to Parallel Computing: Parallel Programming and Parallel Computing, Overview of Parallel Architectures and Parallel Programming Models, MIMD and SPMD Models, Problems Unique to Parallel Programming,

Supercomputers and Grand Challenge Problems, Modern Parallel Computers, Data Dependence Graph, Data Parallelism, Functional Parallelism, Pipelining and Data Clustering.

Interconnection Networks: Switch Network Topologies, Direct and Indirect Network Topology, Bus, Star, Ring, Mesh, Tree, Binary Tree Network, Hyper Tree Network, Hybrid, Hypercube, Perfect Shu E Network, Torus and Butterfly Network.

Performance Analysis: Introduction, Execution Time, Speedup, Linear and Super linear Speedup, Efficacy and Efficiency, Amdahls Law and Amdahl Effect, Gustafson-Barsiss Law, Minsky's Conjecture, The Karp-Flatt Metric, The Iso-Efficiency Metric, Iso-Efficiency Relation, Cost and Scalability.

Parallel Computational Models: Flynn's Taxonomy, PRAM, EREW, CREW, ERCW, CRCW, Simulating CRCW, CREW and EREW, PRAM Algorithms.

Introduction To Parallel Algorithms: Parallel Programming Models, PVM, MPI Paradigms.

Parallel Programming Languages: , Brents Theorem, Simple Parallel Programs in MPI Environments, Parallel Algorithms on Network, Addition of Matrices, Multiplication of Matrices.

TEXT BOOKS:

1. Computer Architecture and Parallel Processing, Hwang and Briggs, McGraw Hill.
2. Parallel Programming in C with MPI and Open MP, Michael J.Quinn, McGrawHill , 2004

REFERENCE BOOKS:

1. Introduction to Distributed and Parallel Computing, Crichlow, PHI.
2. Designing Efficient Algorithms for Parallel Computers, M.J.Quinn, McGraw-Hill.
3. Introduction to Parallel Processing, Shashi Kumar M et al., PHI New Delhi.
4. Elements of Parallel Computing, V.Rajaraman, Prentice-Hall of India.
5. The Design and Analysis of Parallel Algorithms, S.G.Akl, PHI.

COMPUTER VISION

Theory	: 4 Periods	Sessionals	: 30
Exam	: 3 Hrs.	Ext. Marks	: 70
		Credits	: 4

COURSE OBJECTIVES:

1. The fundamentals of Computer Vision.
2. Computer vision is to develop the theoretical and algorithmic basis by which useful information about the world can be automatically extracted and analyzed from a single image or a set of images.
3. Image processing techniques, feature extraction techniques, imaging models and camera calibration techniques, stereo vision, and motion analysis.

COURSE OUTCOMES:

1. Students demonstrate a thorough understanding of fundamental concepts in computer vision
2. Students must be able to design and conduct experimental validation for a computational approach to a computer vision problem, and interpret the results to assess the performance
3. Students are familiar with methods used in various vision-based applications – image feature detection, 3-D reconstruction, segmentation.

SYLLABUS

Fundamentals of Image Processing: Image Acquisition, Definitions of Pixel, Gray Value, Sampling, Quantization, Histogram, Image Sliding, Image Stretching. Distance and Connectivity. Image Smoothing Operations - Mean, Median, Mode Filters. Edge Enhancement Filters - Directional Filters, Laplacian, Sobel, Robert. Definition of Image Compression - Run Length Encoding Method, Contour Encoding Method. Definition of Segmentation - Pixel based method of segmentation.

Morphological Operations: Definition of Thresholding, A few techniques of thresholding. Importance of Binary Images. Erosion, Dilation, Opening, Closing, HIT -or -MISS Transformation, Thinning, Thickening, Skeletons, Pruning, Convex hull. Extensions to Gray - Scale Images. Applications of Gray - Scale Morphology. Applications of Morphological Operations in Pattern Analysis.

Shape Representation and Descriptions (Part - 1): Region Identification, Algorithms for Region Identification, Shape Representation and Description - Chain Codes, Geometric Border Representation - Boundary Length, Curvature, Bending Energy, Signature, Chord Distribution, Fourier Transforms of Boundaries, Boundary Description using Segment Sequences, B-Spline Representation, Shape invariants.

Shape Representation and Descriptions (Part - 2): Region - Based Methods - Area - Algorithms for Calculation of Area. Euler's Number, Projections, Eccentricity, Elongatedness, Rectangularity, Direction, Compactness. Detailed Discussion on - Moments. Convex hull, Algorithms related to Convex hull. Graph Representation - Algorithm for Skeleton, Algorithm for Graph Construction. Definitions of Region Decomposition, Region Neighborhood Graphs, Shape Classes.

Object Recognition: Knowledge Representation, Statistical Pattern Recognition, - Classification Principles, Classifier Setting, Classifier Learning. Syntactic Pattern Recognition - Grammars, and Languages, Syntactic Analysis, Syntactic Classifier. Recognition as Graph Matching - Isomorphism, Related Algorithms. Similarity of Graphs.

Cluster Analysis: Definition, Hierarchical Clustering, - Agglomerative Clustering Algorithms, Single - Linkage Algorithm, Complete Linkage Algorithm, Average - Linkage Algorithm, Ward's Method. Partitional Clustering - Definition, Forgy's Algorithm, K - Means Algorithm, Isodata Algorithm. Applications in Pattern Analysis.

Artificial Neural Networks and Fuzzy Logic in Pattern Analysis: Introduction to ANN, Architecture of ANN, Activation Functions, Training of ANN - Supervised, Unsupervised, Reinforced, McCulloch - Pitts Model, HEBBNET, ADELIN, Application of ANN in Pattern Analysis. Definition and Brief Discussion about Fuzzy Logic, Fuzzy Sets. Application in Pattern Analysis.

TEXT BOOKS:

1. Pattern Recognition and Image Analysis, Earl Gose, Richard Johnsonbaugh, Steve Jost , PHI
2. Image Processing, Analysis and Machine Vision, Milan Sonka, Vaclav Hlavac, VIKAS

REFERENCE BOOK:

1. Introduction to Artificial Neural Networks, S.N. Sivanandam, M. Paul Raj , VIKAS

DATA STRUCTURES & PROGRAMMING LAB
(Common for M.Tech (CST, IT))

Lab	: 3 Periods	Sessionals	: 50
Exam	: 3 Hrs.	Ext. Marks	: 50
		Credits	: 2

COURSE OBJECTIVES:

1. To introduce the graduate, simple linear & non-linear data structures.
2. To make the student write ADTs, for all data structures
3. To make the student learn different algorithm design techniques.

COURSE OUTCOMES:

At the end of this course student able to implement

1. Linear data structures
2. Non-linear data structures
3. Sorting and searching techniques

SYLLABUS**Implementation of Data Structures and Algorithms using C++**

1. To perform various operations such as insertion, deletion, display on single linked lists.
2. To implement
 - (i) Stacks using linked list. (ii) Queues using linked list.
3. To perform different types of searching techniques on a given list
 - (i) Sequential search (ii) Binary search (iii) Fibonacci search
4. To perform different types of sortings on a given list
 - (i) Bubble sort (ii) Insertion sort (iii) Selection sort (iv) Merge sort
5. To perform different types of sortings on a given list
 - (i) Quick sort (ii) Shell sort (iii) Radix sort
6. To perform the following
 - (i) To convert the given infix expression to postfix expression
 - (ii) To evaluate the given postfix expression.
7. To perform various operations on graphs
 - (i) Vertex insertion. (ii) Vertex deletion.
 - (iii) Edge insertion. (iv) Edge deletion.
 - (v) Breadth First traversal. (vi) Depth First traversal.
8. To implement dictionaries using hashing technique
9. To perform various operations on binary heap.
10. To perform various operations on Binary search tree.
11. To perform operations on AVL trees.
12. To perform various operations on B-tree.

REFERENCE BOOKS:

1. Data Structure, Algorithm and OOP, Gregory L. Heileman (Tata Mc Graw Hill Edition).
2. Data Structures & Algorithm in C++, Adam Drozdek. Vikas publication House.
3. Data Structures, Algorithms and Applications in C++, Sartaj Sahni, Mc Graw-Hill International Edition.

DATA BASE MANAGEMENT SYSTEMS LAB
(Common for M.Tech (CST, IT))

Lab	: 3 Periods	Sessionals	: 50
Exam	: 3 Hrs.	Ext. Marks	: 50
		Credits	: 2

COURSE OBJECTIVES:

1. To teach the graduate database design and query and PL/SQL.

COURSE OUTCOMES:

Student able to

1. Create Small applications using databases, Retrieve information from databases by using queries
2. Implement procedures and triggers

SYLLABUS

Accessing the Database: The first laboratory exercise is to connect to a database, populate it with data, and run very simple SQL queries. (Data Definition, Table Creation, Constraints, Insert, Select Commands, Update & Delete Commands.)

Basic SQL: This lab covers simple SQL queries. (Inbuilt functions in RDBMS.)

Intermediate SQL: This lab covers more complex SQL queries. (Nested Queries & Join Queries, Control structures)

Advanced SQL: This lab covers even more complex SQL queries. (Procedures and Functions, .PL/SQL, Cursors and Triggers)

Database Access from a Programming Language: This lab introduces you to database access from a programming language such as Java or C#. Although phrased using Java/JDBC, the exercise can be done using other languages, ODBC or ADO.NET APIs.

Building Web Applications: This lab introduces you to construction of Web applications. Although phrased using the Java Servlet API, the exercise can be done using other languages such as C# or PHP.

Project: Each student is assigned with a problem. The student is to develop a logical and physical database design for the problem and develop Forms, Menu design and Reports.

A. The logical design performs the following tasks:

1. Map the ER/EER diagrams to a relational schema. Be sure to underline all primary keys, include all necessary foreign keys and indicate referential integrity constraints.
2. Identify the functional dependencies in each relation
3. Normalize to the highest normal form possible

B. Perform physical design based above logical design using Oracle/MSSQL on Windows platform and MySQL/PostgreSQL on Linux platform.

SAMPLE TERM PROJECTS:

1. Retailer database
2. Automobile sales database
3. Electronics vendor database
4. Package delivery database
5. Real estate database

REFERENCE BOOKS:

1. Database System Concepts, Avi Silberschatz , Henry F. Korth , S. Sudarshan ,McGraw-Hill, Sixth Edition, ISBN 0-07-352332-1.
2. ORACLE PL/SQL by example. Benjamin Rosenzweig, Elena Silvestrova, Pearson Education 3rd Edition
3. ORACLE Database Log PL/SQL Programming Scott Urman, TMG Hill.
4. SQL & PL/SQL for Oracle 10g, Black Book, Dr.P.S. Deshpande.
5. Oracle PL/SQL Programming, Steven Feuerstein, O'Reilly Publishers.

DEPARTMENT OF INFORMATION TECHNOLOGY
M.TECH (INFORMATION TECHNOLOGY)
Scheme of Instruction and Examination
(Regulation:R16)
(with effect from **2016-2017** admitted batch onwards)

II – SEMESTER

Code No.	Course title	Credits	Lecture Hrs	Lab Hrs	Total Contact Hrs/Week	Sessional Marks	Exam Marks	Total Marks
M16 IT 1201	Web Systems & Technologies	4	4	-	4	30	70	100
M16 CST 1202	Object Oriented Software Engineering	4	4	-	4	30	70	100
M16 IT 1202	Information Security & Cryptography	4	4	-	4	30	70	100
M16 IT 1203	Wireless & Mobile Networks	4	4	-	4	30	70	100
#3	Elective- III	4	4	-	4	30	70	100
#4	Elective -IV	4	4	-	4	30	70	100
M16 IT 1216	Network Programming & Web Programming Lab	2	-	3	3	50	50	100
M16 CST 1214	OOSE Lab	2	-	3	3	50	50	100
M16 IT 1217	Seminar	2	-	-	-	100	-	100
Total		30	24	6	30	380	520	900

	Course Code	Course
#1-Elective-III	M16 IT 1204	Mathematics Of Internet Systems & Control
	M16 IT 1205	IT Infrastructure Planning & Management
	M16 IT 1206	Geo-Informatics
	M16 IT 1207	Data Base Security
	M16 IT 1208	Business Intelligence
	M16 IT 1209	Big Data Analysis
#2-Elective-IV	M16 IT 1210	Mobile Computing
	M16 IT 1211	Soft Computing
	M16 IT 1212	Cluster Computing
	M16 IT 1213	Pervasive Computing
	M16 IT 1214	Semantic Web
	M16 IT 1215	Data warehousing & Data Mining

WEB SYSTEMS & TECHNOLOGIES

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To understand the advanced technologies of java JDBC, ASP, Servlets, EJB etc.
2. To design and Develop Servlets to Handle Server-side Exceptions.
3. To design applications using databases
4. To design beans using EJB

COURSE OUTCOMES:

1. Student knows about the advanced Java and design applications using Database Design Applications and web pages for personal, Educational and business purposes.
2. Develop mobile computing applications based on the paradigm of context aware computing and wearable computing

SYLLABUS

Introduction: History of the Internet and world wide web and HTML, Basic Internet Protocols-HTTP, SMTP, Pop3, Mime, IMAP, Introduction to scripting Languages-Java Scripts, Object based Scripting for the web structures, functions, arrays and Objects, Dynamic HTML with Java Script

Dynamic HTML: Introduction to Object references, Dynamic Style, Dynamic Position, Frames, Navigators, Event Models, On Check, On load, Mouse operations, Adding Shaddows, Creating Images, Creating Gradients, Creating Motion with Blur, Data binding, Sorting Table data, Binding of Images And Table.

Introduction to PHP Programming: Introduction, Database Access with PHP, PHP Interpreters, Security Issues, File Handling with PHP, Working with HTML and DHTML, PHP User Authentication.

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDk; Introspection, Using Bound properties, Bean Info Interface, Constrained properties; Persistence, Customizes, Java Beans API, Introduction to EJB's

Multimedia: Audio and Video Speech, Synthesis and Recognition, E-Business Models, Online Payments and Security, Web Servers, Client and Server side Scripting, Accessing Web servers, Apache Web Server.

Database, ASP and XML: RDBMS Models, Overview of SQL, , ASP-Working of ASP, objects, Session Tracking and Cookies, ADO, Accessing Data Base with ASP, Serverside Active, X Components, Web resources, XML- Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX, Syntax of AJAX, Application Development using XML and AJAX.

Servlets and JSP: Introduction to Servelets: Servlet Overview Architecture, HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues, Multitier architecture, JSP Overview, , JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment.

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing, Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Data between Pages, Sharing Session and Application Data – Memory Usage Considerations

TEXT BOOKS:

1. Web Programming, building internet applications, 2/e, Chris Bates, Wiley Dreamtech
2. The complete Reference Java 2 ,5/e, Patrick Naughton , Herbert Schildt. TMH
3. Programming world wide web-Sebesta, PEA

REFERENCE BOOKS:

1. Internet , World Wide Web , How to program, Dietel , Nieto, PHI/PEA
2. Jakarta Struts Cookbook , Bill Siggelkow, S P D O'Reilly
3. Web Tehnologies, 2/e, Godbole, kahate, TMH,202,
4. An Introduction to web Design , Programming ,Wang,Thomson
5. Web Applications Technologies Concepts-Knuckles, John Wiley

OBJECT ORIENTED SOFTWARE ENGINEERING

(Common for M.Tech (CST, IT))

Theory	: 4 Periods	Sessionals	: 30
Exam	: 3 Hrs.	Ext. Marks	: 70
		Credits	: 4

COURSE OBJECTIVES:

1. To understand the Object oriented modelling using UML
2. To enable the student to get knowledge in SDLC (Analysis design , code and testing)
3. Introducing the various design approaches, models and metrics.
4. Understanding of Software Project Management including Planning/scheduling.
5. Emphasis on Black box, white box testing strategies

COURSE OUTCOMES:

1. Student Knows about the techniques of planning and monitoring the progress of a software project.
2. Project management and cost estimation techniques
3. Be familiar with software development team architectures

SYLLABUS

Introduction to Object Oriented Software Engineering: Nature Of The Software, Types Of Software , Software Engineering Projects, Software Engineering Activities, Software Quality, Introduction To Object Orientation, Concepts Of Data Abstraction, Inheritance & Polymorphism, Software Process Models-Waterfall Model, The Opportunistic Model , The Phased Released Model, The Spiral Model, Evolutionary Model, The Concurrent Engineering Model

Requirements Engineering: Domain Analysis, Problem Definition And Scope, Requirements Definition, Types Of Requirements, Techniques For Gathering And Analyzing Requirements, Requirement Documents, Reviewing, Managing Change In Requirements.

Unified Modeling Language & Use Case Modeling: Introduction To UML, Modeling Concepts, Types Of UML Diagrams With Examples; User-Centred Design, Characteristics Of Users, Developing Use Case Models Of Systems, Use Case Diagram, Use Case Descriptions, The Basics Of User Interface Design, Usability Principles, User Interfaces.

Class Design and Class Diagrams: Essentials Of UML Class Diagrams, Associations And Multiplicity, Other Relationships, Generalization, Instance Diagrams, Advanced Features Of Class Diagrams, Interaction And Behavioural Diagrams: Interaction Diagrams, State Diagrams, Activity Diagrams, Component And Deployment Diagrams.

Software Design And Architecture: The Process Of Design, Principles Leading To Good Design, Techniques For Making Good Design Decisions, Writing A Good Design Document., Pattern Introduction, Design Patterns: The Abstraction-Occurrence Pattern, General Hierarchical Pattern, The Play-Role Pattern, The Singleton Pattern, The Observer Pattern, The Delegation Pattern, The Adaptor Pattern, The Façade Pattern, The Immutable Pattern, The Read-Only Interface Pattern And The Proxy Pattern; Software Architecture Contents Of An Architecture Model, Architectural Patterns: The Multilayer, Client-Server, Broker, Transaction Processing, Pipe & Filter And MVC Architectural Patterns.

Software Testing: Overview Of Testing, Testing Concepts, Testing Activities, Testing Strategies, Unit Testing, Integration Testing, Function Testing, Structural Testing, Class Based Testing Strategies, Use Case/Scenario Based Testing, Regression Testing, Performance Testing, System Testing, Acceptance Testing, Installation Testing, OO Test Design Issues, Test Case Design, Quality Assurance, Root Cause Analysis, Post-Mortem Analysis.

Software Project Management: Introduction To Software Project Management, Activities Of Software Project Management, Structure Of Project Plan, Software Engineering Teams, Software Cost Estimation, Project Scheduling, Tracking And Monitoring.

Case Study:

- a. Simple Chat Instant Messaging System
- b. GPS Based Automobile Navigation System
- c. Waste Management Inspection Tracking System (WMITS)
- d. Geographical Information System

TEXT BOOK:

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

REFERENCE BOOKS:

1. Object-Oriented Software Engineering: Using UML, Patterns and Java, Bernd Bruegge and Allen H. Dutoit, 2nd Edition, Pearson Education Asia.
2. Software Engineering: A Practitioner's Approach, Roger S Pressman.
3. A Practical Guide to Testing Object-Oriented Software, John D. McGregor; David A. Sykes, Addison-Wesley Professional.

INFORMATION SECURITY AND CRYPTOGRAPHY

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. Identify and prioritize information assets.
2. Identify and prioritize threats to information assets.
3. Define an information security strategy and architecture.
4. Plan for and respond to intruders in an information system
5. Describe implications of security and privacy issues.
6. Present a disaster recovery plan for recovery of information assets after an incident

COURSE OUTCOMES:

Student can know about

1. Identify and prioritize information assets, threats
2. Define an information security strategy and architecture.
3. Plan for and respond to intruders in an information system and plan for recovery of information assets after an incident

SYLLABUS

Introduction: Introduction to Security, Security Approaches, Principles of Security; Security Services and Mechanism-confidentiality, Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability; Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

Network Security: A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, Introduction to TCP/IP TCP , fire walls, session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks, Virtual Private Networks, Brief Study on Cryptography and Security

User Authentication Mechanisms: Introduction, Authentication Basics, Passwords authentication tokens, Certificate based authentications, Biometrics based authentication , Kerberos, X.509 Directory Authentication Service, SSO Approaches

Public Key Infrastructure: Public key cryptography principles and algorithms, digital signatures, digital Certificates, Certificate Authority and key management, Public Key Cryptography Standards, Private Key Management, The PRIX Model, XML,PKI and Security

Symmetric Key Cryptographic Algorithms: Overview of symmetric Key Cryptography Algorithm types and modes; DES, IDEA, RC5, BLOWFISH, AES Algorithms; Differential and Linear Cryptanalysis.

Asymmetric Key Cryptographic Algorithms: Overview of Asymmetric Key cryptography, RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signature, Knap sack Algorithm and other Algorithms.

IP Security and Fire walls: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management, Firewall Design principles, Trusted Systems, Intrusion Detection Systems.

Practical Implementation of Cryptography & Security: Cryptographic Solutions using Java, Cryptographic Solutions Using Microsoft, Cryptographic Tool Kit, Security and Operating Systems Pretty Good Privacy (PGP) and S/MIME.

TEXT BOOKS:

1. Network Security Essentials :Applications and Standards, William Stallings PEA.
2. Cryptography and Network Security, Atul Kahate, Tata McGraw Hill

REFERENCE BOOKS:

1. Hack Proofing your network, Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik, Ryan Permech, Wiley Dreamtech,
2. Fundamentals of Network Security, Eric Maiwald (Dreamtech press)
3. Network Security - Private Communication in a Public World, Charlie Kaufman, Radia Perlman, Mike Speciner, PEA/PHI.
4. Principles of Information Security, Whitman, Thomson.
5. Cryptography and network Security, Third edition, Stallings, PHI/PEA
6. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
7. Introduction to Cryptography, Buchmann, Springer.

WIRELESS & MOBILE NETWORKS

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To understand the basics of Mobile wireless Networking
2. To learn the role of Wireless networks in Mobile
3. To expose to the concept of Adhoc networks

COURSE OUTCOMES:

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

1. Know various mobile wireless network
2. Know different Adhoc networks
3. Know about mobile data network
4. Work out security measures in Adhoc

SYLLABUS

Introduction: Introduction to Wireless Networks, Various Generations of Wireless Networks, Virtual Private Networks- Wireless Data Services, Common Channel Signaling, Various Networks for Connecting to the Internet, Blue tooth Technology, Wifi-WiMax- Radio Propagation mechanism , Pathloss Modeling and Signal Coverage

Wireless Local Area Networks: Introduction-WLAN topologies-IEEE 802.11 Standards, MAC Protocols, Comparison of 802.11 a,b,g and n Standards, HIPER LAN , ZigBee 802.15.4, Wireless Local Loop

Wireless Adhoc Networks: Basics of Wireless Networks, Infrastructured Versus Infrastructureless Networks – Properties of Wireless, AD hoc Networks, Types of Ad Hoc Networks, Challenges in AD Hoc Networks –Applications of Wireless AD Hoc Networks

Routing Protocols for Ad Hoc Networks: Introduction-Proactive Routing Protocols- Reactive Routing protocols-Hybrid Routing Protocols-QoS Metrics-Energy impact issues in Routing.

Other Wireless Technologies: Introduction, IEEE 802.15.4 and Zigbee, General Architecture, Physical Layer, MAC layer, Zigbee, WiMAX and IEEE 802.16, Layers and Architecture, Physical Layer, OFDM Physical layer.

Mobile Communications: Introduction to cellular concept, Frequency Reuse, Handoff, GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services, Introduction to mobile computing, novel applications, limitations, and architecture.

Mobile Data Networks: Location/mobility management, Mobile IP, Dynamic routing protocols, Location-based protocols, Emerging topics: sensor networking, Data-Oriented CDPD network, GPRS and higher data rates, Short messaging service in GSM.

Security in Ad Hoc Networks: Introduction- Security Attacks, Intrusion Detection System, Intrusion Prevention system, Intrusion Response system, Wired Equivalent Privacy(WEP) - A Security Protocol for Wireless Local Area Networks (WLANs), Security in MANETs.

TEXT BOOKS:

1. Principles of Wireless Networks , Kaveth Pahlavan, K. Prasanth Krishnamurthy, Pearson Publications, Asia, 2002
2. Mobile Cellular Communications, G.Sasibhusan Rao, Pearson Publications.

REFERENCE BOOK:

1. Guide to Wireless Ad Hoc Networks: Series: Computer Communications and Networks, Misra, Sudip; Woungang, Isaac; Misra, Subhas Chandra, 2009, Springer

MATHEMATICS OF INTERNET SYSTEMS & CONTROL

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

Understands the basic network and its graphs of internet systems and helps to find out the high throughput of a network. The student can learn different congestion control algorithms and can know parallel and distributed computation techniques.

COURSE OUTCOMES:

1. Able to know web basics and algorithms
2. Able to understand structure of internet search engine
3. Able to know real-time sources
4. Able to compute real time search engine

SYLLABUS

Introduction : Basics of Networks & Graphs: Random growth of graphs, adjacency matrix and power laws, The Internet Graph, The Web Graph, Graph Communities and the Web, Basics of Probability and algorithms: Computational Complexity, Exponential problems, decidability, compressing & hashing, Randomized algorithms, randomness and humans, Resource sharing between elastic & inelastic users

Design and Control of communication networks: Randomly fluctuating demands and failures by adapting rates, rerouting of network traffic & reallocating resources

Rate Control algorithms for Internet: Stability & fairness, economic issues, scalable models for simulation, Concepts in Congestion avoidance & Control, Maximizing throughput of network & Minimizing packet-loss ratio for Networks

Linear Analysis with Delay: Primal Controllers-High Throughput TCP and AVQ, Dual Algorithm, Primal Dual Algorithm, Exponentially smoothed rate feedback, Proportionally-fair controller

Congestion Control Algorithms for Internet: Algorithms for single link and single flow-Window Flow Control, Random early detection (RED), explicit congestion notification (ECN), High throughput TCP, stochastic and deterministic models in congestion control, Resource allocation for congestion control

Anatomy of Internet Search Engine: Basic Data Structure, Crawling the Web, Page Relevance and Ranking, Answering the user queries, Role of distributed & parallel computing internet Browsers and search engines: Caching web pages, browsers and search engines, DNS tree, File sharing on internet

Parallel and distributed Computation: Basic rules of cooperation, logical problems on working in parallel, distributed world, routing methods

Real-time Sources and Distributed Control: Probing & Distributed Admission Control, Queuing Model at Link Buffer, Diffusion Approximation-Brownian Motion Through a Queue

TEXT BOOKS:

1. Mathematical and Algorithmic Foundations of the Internet, Fabrizio Luccio, Linda Pagli and Graham Steel, Chapman & Hall, 2011
2. The Mathematics of Internet Congestion Control (Systems and Control: foundations and Applications), Birkhauser Boston, 2003

REFERENCE BOOK:

1. Linked: The New Science of Networks, Barabasi A.L, Perseus Publishing, Cambridge, 2002

IT INFRASTRUCTURE PLANNING AND MANAGEMENT

Theory	: 4 Periods	Sessionals	: 30
Exam	: 3 Hrs.	Ext. Marks	: 70
		Credits	: 4

COURSE OBJECTIVES:

1. Document the different phases in the life cycle of an IT infrastructure project.
2. Gather background information and research and describe its impact on the project.
3. Describe and explain the main features of project evaluation.

COURSE OUTCOMES:

At the end the course

1. Able to find out primary issues of a project.
2. Able to find out different operations in a project.
3. Able to handle a project without any problems.

SYLLABUS

Introduction to Infrastructure Planning and Management: Computer Basics, Network and Internet, Computing Resources, Information Technology, IT Infrastructure Management, Challenges in IT Infrastructure Management

Design Issues: Design Issues of IT organizations and IT Infrastructure, Determining Customer Requirements, IT system Management Process, IT Services Management Process, Information System Design Process, Patterns for IT Systems Managements, IT infrastructure Library

Virtualization: Desktop Virtualization Applications, Remote Desktop Services, Terminal Services, Server Virtualization, Selecting the right Virtualization Technology, Dynamic Datacenter

System Center: System Center Service Manager, System Center Data Protection Manager, System Center Virtual Machine Manager, System Center Operations Manager, System Center Configuration Manager, Dynamic Datacenter

Storage Management: Introduction to Storage, Backup and Storage, Archive and Retrieve, Disaster Recovery, Space Management, Database and Application Protection, Bare Machine Recovery, Data Retention, Microsoft SQL Server/Database Server

Desktop Scenarios: Windows Optimized Desktop Scenarios, Communication & Collaboration Exchange Server, SharePoint Server

Security: Computer Security, Internet Security, Physical Security, Malware Response, Forefront Identity Manager, Forefront Unified Access Gateway, Selecting the Right NAP Architecture

Case Study: Any Case Study Consisting of (Eg. Asset Network Incorporation)- IT Service Continuity Management, Capacity Management, Availability Management, Configuration Management, Incident Management, Problem Management, Storage Management, Identity Management

TEXT BOOK:

1. IT Infrastructure & Its Management, Guptha, TMH

REFERENCE BOOKS:

1. Infrastructure planning and design-microsoft
2. Selecting the right virtualization Technology by-Microsoft inc
3. IPD in the Technet Library
4. IPD in the Microsoft Partner Network
5. Microsoft Solution Accelerator

GEO INFORMATICS

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To learn the basic concepts of geo-informatics in brief that includes Geographical Information System (GIS), Remote Sensing (RS), and Global Positioning System (GPS).
2. To learn the data needs and database development analysis in GIS environment.
3. To understand various applications of GIS

COURSE OUTCOMES:

1. Graduates will demonstrate the ability to model and development of application in Geospatial arena interpret and analyze data, and report results.
2. Graduates will demonstrate the ability to develop Geospatial system that meets desired specifications and requirements
3. Graduates will demonstrate an understanding of their professional and ethical responsibilities.

SYLLABUS

Introduction: Definition of GIS and Related Terminology-Evolution of GIS-Components of GIS-Approaches to study of GIS Maps and GIS: Map Scale- Classes of maps-The mapping Process-Plane coordinate systems and Transformations- Geographic Coordinate System of Earth- Map Projection- Establishing a spatial framework for mapping Locations on Earth-Geo-referencing-Acquisition of Spatial Data for the terrain- Topographic Mapping-Attribute Data for Thematic Mapping

Digital Representation of Geographic Data: Technical Issues Pertaining to Digital Representation of Geographic Data-Database creation and management-Raster Geographic and Vector data representation-Object oriented Geographic Data representation-Relationship between Data representation and Data Analysis in GIS Data Quality and Data Standards: Concepts and Definitions of Data Quality-Components of Geographic Data Quality-Assessment of Data Quality- Managing Spatial Data Errors-Geographic Data Standards-Geographic Data Standards And GIS Development

Raster and Vector-Based GIS Data Processing: Acquiring and Handling Raster Data Processing Cartographic Modeling- Characteristics of Vector- Based GIS Data Processing Vector Data Input Functions Non-topological GIS Analysis Functions Feature-Based Topological Functions Layer-Based Topological Functions Vector-Based Output Functions Application Programming

Visualization of Geographic Information and Generation: Cartography in the Context of GIS-Human-Computer Interaction and GIS- Visualization of Geographic Information Principles of Cartographic Design in GIS-Generation of Information Products

Remote Sensing and GIS Integration: Principles of Electromagnetic Remote Sensing System Classifications-Imaging Characteristics of Remote Sensing Systems-Extraction of Metric Information from Remotely Sensed Images-Extraction of Thematic Information from Remotely Sensed Images- Integration of Remote Sensing and GIS

Digital Terrain Modeling: Definitions and Terminology Approaches to Digital Terrain-Data Sampling- Acquisition of Digital Terrain Data-Data Processing, Analysis, and Visualization-Applications of Digital Terrain Models.

Spatial Analysis and Modeling: Descriptive Statistics-Spatial Auto Correlation- Quadratic Counts and Nearest- Neighbor Analysis-Trend Surface Analysis-Gravity Models-Network Analysis-GIS Modeling

GIS Implementation and Project Management: Software Engineering as Applied to GIS-GIS Project Planning-Systems Analysis and User Requirements-Geographic Database Design Methodology-GIS Application Software Design Methodology-Systems Implementation and Technology Rollout-Systems Maintenance and Technical Support, GIS Issues and Prospects: Issues of Implementing GIS-The Trend of GIS-Development Frontiers of GIS Research.

TEXT BOOK:

1. Concepts and Techniques of Geographic Information Systems, by C. P. Lo & Albert K. W. Yeung, Prentice Hall of India Ltd

REFERENCE BOOKS:

1. An Introduction to Geographical Information Systems, by Ian Heywood, Sarah Cornelium & Steve Carver, Pearson Education
2. Introduction to Geographic Information Systems, by Kang-rsung Chang, Tata McGraw Hill Publishing Company Limited

DATABASE SECURITY

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To understand the basic concepts of database security.
2. To learn security issues and solutions
3. To understand threats to learn how to perform data encryption.
4. To understand Enterprise Security Policy

COURSE OUTCOMES:

1. Able to understand the database security framework
2. Will be able to learn database access control
3. Will be able to understand database security techniques.
4. Will be able to implement security for databases.

SYLLABUS

Introduction To Database Security: Fundamental Data Security Requirements, Data Security Concerns, Compliance Mandates, Security Risks, Developing Enterprise Security Policy, Defining a Security Policy, Implementing a Security Policy, Techniques to Enforce Security

Database Access Control: User Authentication, Protecting Passwords, Creating Fixed Database Links, Encrypting Database Link Passwords, Using Database Links Without Credentials, Using Database Links And Changing Passwords, Auditing With Database Links, Restricting A Database Link With Views, Trust Management & Negotiation

Database Security Issues: Database Security Basics, Security Checklist, Reducing Administrative Effort, Applying Security Patches, Default Security Settings, Secure Password Support, Enforcing Password Management, Protecting The Data Dictionary, System and Object Privileges, Secure Data Outsourcing, Security in Advanced Database Systems, Security in Data Warehousing and OLAP Systems, Managing Enterprise User Security

Framework For Database Security,: Security for Workflow Systems, Secure Semantic Web Services, Spatial Database Security, Security Reengineering, Strong Authentication, Single Sign-On, Public Key Infrastructure (PKI) Tools, Configuring SSL on the Server, Certificates, Using Kerberos for Authentication

Database Security Solutions: Maintaining Data Integrity, Protecting Data, Controlling Data Access, Combining Optional Security Features, Compliance Scanner, Policy Trends in Database Control, Watermarking: Copyright Protection, Trustworthy Record Retention and Recovery, Privacy-Preserving Data Mining & Data Publishing. Privacy in Location-Based Services

Database Auditing : Auditing Database Users, User Privileges And Objects: Monitoring for Suspicious Activity, Standard Database Auditing, Setting the AUDIT_TRAIL, Specifying Audit Options, Viewing Auditing Options, Auditing the SYSDBA Users, Audit to XML Files, Value-Based Auditing, Auditing DML Statements, Triggering Audit Events, Maintaining the Audit Trail

Database Privileges And Roles: Authorization, Privileges, Benefits of Roles, Using Proxy Authentication With Roles, Creating An Enterprise Role, Securing Objects and Application Roles, Data Masking Primitives And Routines, Privacy in Location- Based Services

Data Encryption For Database Security: Problems Solved by Encryption, Storing the Key in Database, Key Management by User, Application-Based Encryption, Cipher Block Modes , Hash and Message Authentication Code, Transparent Data Encryption (TDE) & File Encryption Methods.

TEXT BOOKS:

1. Database Security, S.Castano, M. Fugini, G. Martella,P. Samarati, Addison-Wesley
2. Database Security By Alfred Basta, Melissa Zgola, Cengage Publication, 2012

REFERENCE BOOKS:

1. Database Security & Auditing By Hassan A Afyouni, Cengage Delmar Learning India Pvt. Ltd, 2009.
2. Handbook Of Database Security:Applications And Trends,Michael Gertz, Sushil Jajodia, Springer.

BUSINESS INTELLIGENCE

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. Use various symbolic knowledge representation to specify domains and reasoning tasks of a situated software agent.
2. Use different logical systems for inference over formal domain representations, and trace how a particular inference algorithm works on a given problem specification.
3. Understand the conceptual and computational trade-offs between the expressiveness of different formal representations.

COURSE OUTCOMES:

1. Understand different types of AI agents
2. Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms)
3. Understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving
4. Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems

SYLLABUS

Introduction to Artificial Intelligence: Artificial Intelligence, AI Problems, AI Techniques, Defining the Problem as a State Space Search, Problem Characteristics , Production Systems, Search: Issues in The Design of Search Programs, Un-Informed Search and Heuristic Search Techniques & Algorithms. AI Applications in Biology, Engineering, Technology and Business

Knowledge Representation: Knowledge General concepts, Representations & Approaches to Knowledge Representation, Forward Vs Backward Reasoning, Symbolic Logic: Computable Functions and Predicates, FOPL Representation of knowledge, Normal Forms, Unification and Resolution, Basic Inference Techniques; Structured Representation of Knowledge: Semantic Nets, Partitioned Semantic Nets, Frames, Conceptual Dependency, Conceptual Graphs, Scripts, CYC

AI Techniques & Programming: Logic Based Programming- AI Programming languages: Overview of LISP & Prolog, Search Strategies in LISP, Production System using Prolog, Fuzzy Logic: Crisp Sets, Fuzzy Sets, Fuzzy Logic Control, Fuzzy Inferences & Fuzzy Systems. Matching Techniques, Partial Matching, Fuzzy Matching Algorithms and RETE Matching Algorithms;, Pattern matching in LISP .

Overview Of Business Intelligence: Managerial, Strategic And Technical Issues Associated With BI , Database Systems And Database Integration, Data Warehousing, Data Marts. Query and Report Generation Technologies, Business Process Modeling & Analysis, Planning: Components of a Planning System, Goal Stack Planning, Hierarchical Planning, Reactive Systems

Business Analytics For BI: Data Ware House Architecture: OLAP, Data Cubes, Reporting Tools, Balance Score card, Dash Board design and Implementations, Data Mining And Analytical Tools, Multidimensional/Hyper Cubes , Enterprise Data – Enterprise Data And Information Flow. Information Management and Regulatory Compliance Case Studies:

Experts Systems : Overview of an Expert System, Structure of an Expert Systems, Different Types of Expert Systems- Rule Based, Model Based, Case Based and Hybrid Expert Systems, Concepts and Practice of DSS Modeling, Knowledge Acquisition and Validation Techniques, Black Board Architecture, Knowledge Building System Tools, Expert System Shells, Expert system Shell in LISP, Fuzzy Expert systems

BI Tools and Intelligent Agents: Overview of Intelligent agents, Design and Implementation of Intelligent Agent system, languages and Tools, Multi-Agent systems; Applications in Adaptive Information Retrieval systems, Decision Support Systems, BI Reporting Tools-BIRT, Pentaho, Integration with mysql server, Knowledge Discovery Systems, Agents in Computational Biology, Smart Systems and Robots.

Case Studies in Business Intelligence: :Business model development from marketing, finance domains-Dimensional modeling, metrics, DataCube creation. Data visualization through BI tools for OLAP operation. Publishing BI reports in Enterprise portals.`

TEXT BOOKS:

1. Artificial Intelligence : A modern Approach, Russell and Norvig, Printice Hall
2. Decision Support and Business Intelligence Systems, Efraim Turban, Ramesh Sharda, Jay Aronson, David King, , Pearson Education, 2009

REFERENCE BOOKS:

1. Introduction To Artificial Intelligence & Expert Systems, Patterson, PHI
2. Multi Agent systems- a modern approach to Distributed Artificial intelligence, Weiss.G, MIT Press.
3. Artificial Intelligence, Elaine Rich, Mcgraw-Hill Publications
4. Artificial Intelligence, George F Luger, Pearson Education Publications
5. The Savy Manager`s Guide GettingOnboard with Emerging IT, David Loshin, Morgan Kauffmann Publishers, 2009

BIG DATA ANALYTICS

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To provide advanced knowledge and skills in the field of Computer Science and Engineering.
2. Capable to quickly adapt to new technology in the field of Big Data, assimilate new information, and solve real world problems.
3. To pursue applied research in the advance field of computer science and be committed to life-long learning activities.

COURSE OUTCOMES:

On completion of the programme the graduates will

1. Be able to apply the knowledge of computing tools and techniques in the field of BigData For solving real world problems encountered in the Software Industries
2. Be able to analyze the various technologies & tools associated with Big Data.
3. Be able to identify the challenges in BigData with respect to IT Industry and pursue quality research in this field with social relevance

SYLLABUS

Introduction:, Velocity, Variety, Veracity; Drivers for Big Data, Sophisticated Consumers, Automation, Monetization, Big Data Analytics Applications: Social Media Command Center, Product Knowledge Hub, Infrastructure and Operations Studies, Product Selection, Design and Engineering, Location-Based Services, Online Advertising, Risk Management

Architecture Components: Massively Parallel Processing (MPP) Platforms, Unstructured Data Analytics and Reporting: Search and Count, Context-Sensitive and Domain-Specific Searches, Categories and Ontology, Qualitative Comparisons, Data Privacy Protection, Real-Time Adaptive Analytics and Decision Engines

Advanced Analytics Platform: Real-Time Architecture for Conversations, Orchestration and Synthesis Using Analytics Engines, Entity Resolution, Model Management, .Discovery Using Data at Rest, Integration Strategies

Implementation of Big Data Analytics: Revolutionary, Evolutionary, or Hybrid, Big Data Governance, Integrating Big Data with MDM, Evolving Maturity Levels

Map-Reduce and the New Software Stack: Distributed File Systems .Physical Organization of Compute Nodes, Large-Scale File-System Organization, Map-Reduce features: Map Tasks, Grouping by Key, Reduce Tasks, Combiners, Map-Reduce Execution, Coping With Node Failures, Algorithms Using Map-Reduce for Matrix multiplication, Relational Algebra operations, Workflow Systems, Recursive Extensions to Map-Reduce

Communication Cost Models, Complexity Theory for Map-Reduce, Reducer Size and Replication Rate, Graph Model and Mapping Schemas, Lower Bounds on Replication Rate.

Mining Data Streams: Stream Data Mode l and Management Stream Source, Stream Queries, and issues, Sampling Data in a Stream , Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Counting Ones in a Window, Decaying Windows

Link Analysis: PageRanking in web search engines, Efficient Computation of PageRank using Map-Reduce and other approaches, Topic-Sensitive PageRank , Link Spam, Hubs and Authorities

TEXT BOOKS:

1. Big Data Analytics:Disruptive Technologies for Changing the Game, Dr. Arvind Sathi,, First Edition October 2012, IBM Corporation
2. Mining of Massive Datasets, Anand Rajarama, Jure Leskovec, Jeffrey D. Ullman.E-book, 2013

REFERENCE BOOK:

1. Big Data Imperatives, Soumendra Mohanty, Madhu Jagadeesh, Harsha Srivatsa, Apress, e-book of 2012

MOBILE COMPUTING

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. Introduction of an advanced element of learning in the field of wireless communication.
2. The students to the concepts of wireless devices and mobile computing.
3. To introduce wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices.

COURSE OUTCOMES:

1. A working understanding of the characteristics and limitations of mobile hardware devices including their user-interface modalities
2. The ability to develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.
3. A comprehension and appreciation of the design and development of context-aware solutions for mobile devices.

SYLLABUS

Introduction to Mobile Computing, Overview of Mobile Technologies, Limitations, The Ubiquitous Network, Architecture for Mobile Computing, Three-Tier Architecture, Design Considerations for Mobile Computing, Mobile Computing Through Internet, Mobile Devices and Mobile-Enabled Applications.

Introduction To Wireless Networking, Various Generations of Wireless Networks, Wireless LANs, Advantages and Disadvantages of WLANs, Fixed Network Transmission Hierarchy, Differences in Wireless and Fixed Telephone Networks, Traffic Routing in Wireless Networks, WAN Link Connection Technologies, Cellular Networks.

WLAN Topologies, WLAN Standard IEEE 802.11, Comparison Of IEEE 802.11a, B, G and N Standards, Wireless PANs, Hiper LAN, Wireless Local Loop, ATM, Virtual Private Networks, Wireless Data Services, Common Channel Signaling, Various Networks for Connecting to The Internet.

Emerging Technologies: Introduction - Bluetooth - Radio Frequency Identification (RFID), WIMAX -Mobile IP - Ipv6 - Java Card, TCP/IP in the Mobile Setting, GSM and GPS

Data Management Issues, Data Replication For Mobile Computers, Adaptive Clustering for Mobile Wireless Networks, File System, Disconnected Operations, Data Services in GPRS - Applications for GPRS - Limitations - Billing and Charging.

Communications Asymmetry, Classification of New Data Delivery Mechanisms, Push-Based Mechanisms, Pull-Based Mechanisms, Hybrid Mechanisms, Selective Tuning (Indexing) Techniques. CDMA, GSM , Wireless Data, 3G Networks and Applications.

Introduction to Mobile IP, Introduction To Wireless Application Protocol, Application Layer MMS - GPRS Applications, Short Message Service (SMS): Mobile Computing Over SMS - SMS - Value Added Services Through SMS -Accessing the SMS Bearer.

TEXT BOOKS:

1. Mobile Computing - Technology Applications And Service Creation, Asoke K Talukder and Roopa R.Yavagal, TMH 2006.
2. Mobile Cellular Communication, Gottapu Sasibhushana Rao,, Pearson Education, First Edition, 2013.

REFERENCE BOOKS:

1. Principles Of Computing, Uwe Hansmann, Lothar Merk, Martin S.Nicklous, Thomas Staber, 2nd Ed., Springer International Edition.
2. Mobile Communications, J.Schiller, Addison-Wesley, 2003
3. Stojmenovic And Cacute, "Handbook Of Wireless Networks And Mobile Computing", Wiley, 2002.

SOFT COMPUTING

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. Introduce students to soft computing concepts and techniques and foster their abilities in designing and implementing soft computing based solutions for real-world and engineering problems.
2. Explain the students about fuzzy sets and its operations,
3. Introduce students to fuzzy systems, fuzzy logic and its applications
4. Explain the students about Artificial Neural Networks and various categories of ANN.

COURSE OUTCOMES:

At the end of the course students

1. Able to understand genetic algorithm fundamentals and its operators and procedure
2. Understand artificial neural network model and its activation functions
3. Understand different operations of GA

SYLLABUS

Soft Computing: Introduction to Fuzzy Computing, Neural Computing, Genetic Algorithms, Associative Memory, Adaptive Resonance Theory, Different Tools and Techniques, Usefulness and Applications.

Fuzzy Sets and Fuzzy Logic: Introduction, Fuzzy Sets Versus Crisp Sets, Operations on Fuzzy Sets, Extension Principle, Fuzzy Relations and Relation Equations, Fuzzy Numbers, Linguistic Variables, Fuzzy Logic, Linguistic Hedges, Applications.

Interference in fuzzy logic: fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzifications and Defuzzifications, Fuzzy Controller, Fuzzy Controllers, Fuzzy Pattern Recognition, Fuzzy Image Processing, Fuzzy Database.

Artificial Neural Network: Introduction, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques, perception and convergence rule, Auto-associative and hetro-associative memory, Hebb's Learning, Adaline, Perceptron

Multilayer Feed Forward Network, Back Propagation Algorithms, Different Issues Regarding Convergence of Multilayer Perceptron, Competitive Learning, Self-Organizing, Feature Maps, Adaptive Resonance Theory, Associative Memories, Applications.

Evolutionary and Stochastic Techniques: Genetic Algorithm (GA), Genetic Representations, (Encoding) Initialization and Selection, Different Operators of GA, Analysis of Selection Operations, Hypothesis of Building Blocks, Schema Theorem and Convergence of Genetic Algorithm, Simulated Annealing and Stochastic Models, Boltzmann Machine, Applications.

Rough Set: Introduction, Imprecise Categories Approximations and Rough Sets, Reduction of Knowledge, Decision Tables and Applications.

Hybrid Systems: Neural-Network-Based Fuzzy Systems, Fuzzy Logic-Based Neural Networks, Genetic Algorithm for Neural Network Design and Learning, Fuzzy Logic and Genetic Algorithm for Optimization, Applications

TEXT BOOKS:

1. Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications, S. Rajsekaran and G.A. Vijayalakshmi Pai, Prentice Hall of India.
2. Rough Sets, Z.Pawlak, Kluwer Academic Publisher, 1991.
3. Intelligent Hybrid Systems, D. Ruan, Kluwer Academic Publisher, 1997.

REFERENCE BOOKS:

1. Artificial Intelligence and Intelligent Systems, N.P.Padhy, Oxford University Press.
2. Neural Fuzzy Systems, Chin-Teng Lin & C. S. George Lee, Prentice Hall PTR. Addison-Wesley
3. Learning and Soft Computing, V. Kecman, MIT Press, 2001
4. Fuzzy Sets and Fuzzy Logic, Klir & Yuan, PHI, 1997

CLUSTER COMPUTING

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. The course will provide an insight for achieving cost efficient high performance system.
2. The course will deal with design and architecture of cluster computing.

COURSE OUTCOMES:

At the end of the course student will

1. Have knowledge of virtual technologies and Service-oriented architecture,
2. Have knowledge of Architecture for Cluster Computing, process scheduling and load balancing.

SYLLABUS

Introduction: Overview of Cluster Computing, The Role of Clusters, Definition and Taxonomy Of Parallel Computing, Hardware System Structure, Node Software, Resource Management, Distributed Programming, Limitations

Cluster Planning, Architecture, Node Hardware and Node Software, Design Decisions

Network Hardware: Internet technologies, Ethernet, cLAN, QsNet, Infiniband, Packet Format, NIC Architecture, hubs & Switches.

Network Software: TCP/IP, Sockets, Higher Level Protocols, Distributed File systems, Remote Command Execution

Cluster Setup: Installation & Configuration, System Access Models, Assigning Names, Installation of Node Software, Basic System Administration

Clusters Management: Cluster Workload Management Activities, Queuing, scheduling and monitoring, Resource Management and Accounting

Virtualization technologies; Parallel and Virtual file systems, Introduction, Programming with parallel File systems, Benchmarks

TEXT BOOK:

1. Beowulf Cluster Computing with Linux, 2nd Edition, edited by William Gropp, Ewing Lusk, Thomas Sterling, MIT Press, 2003

REFERENCE BOOKS:

1. In Search of Clusters: The ongoing battle in Lowly Parallel Computing, Gregory F. P Fister, Second Edition, Prentice Hall Publishing Company, 1998.
2. How to Build a Beowulf - A Guide to the Implementation and Application of PC Clusters, Thomas Sterling, John Salmon, Donald J. Becker and Daniel F. Savarese, MIT Press, 1999

PERVASIVE COMPUTING

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. Student can understand underlying technologies and applied standards for building up pervasive solutions.
2. This includes WAP, GPRS, Bluetooth, Infrared, Voice over IP, among others.
3. Expose students to latest technologies that relate to device technologies and pervasive computing, such as wearable computing and smart identification.

COURSE OUTCOMES:

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

1. Identify distinguishing features of the different mobile device categories,
2. Understand the role of the Wireless Application Protocol in enabling mobile devices to access the Internet
3. Understand elementary to medium-level (complexity-wise) user interface applications for all three platforms.

SYLLABUS

Pervasive Computing: Introduction to Ubiquitous Computing (Popularly known as Pervasive Computing), Evolution of Pervasive Computing, Pervasive Computing Principles : Decentralization, Diversification, Connectivity, Simplicity, Pervasive Computing Characteristics, Pervasive Information Technology

Pervasive Architecture: Background, Scalability and Availability, Pervasive Web Application Architecture, Implementation Issues.

Pervasive Devices: Device Categories, Device Characteristics, Software Components in the Device, Information Access Devices, Smart Identification, and Embedded Controls, Hand Held Computers, Cellular Phones, Smart Phones, Smart Cards and Smart Appliances

Pervasive Connectivity: Protocols, Security, Network Management, Mobile Internet, WAN: Cellular Basics, Major Digital Cellular Systems, Advanced Cellular Radio Standards, Short Range Wireless Communication: DECT, Bluetooth, Irda, Home Networks.

Pervasive Applications: Home Services: System View, Communications, Home Automation, Energy and Security Services, Remote Home Health Care Services, Business Services, Healthcare Management, Consumer Services: Interactive Advertisement, Loyalty, Shopping, Payment Services

Pervasive Synchronization: Definition of Synchronization, Models of Synchronization, Challenges In Synchronizing Data, Industry Data Synchronization Standards: Infrared Mobile Communications, WAP, Third Generation Partnership Program, Syncml, Synchronization Solutions

Security Issues in Pervasive Computing : Importance of Security, Cryptographic Patterns And Methods - Light Weight Cryptography -Light Weight Symmetric and Asymmetric Cryptographic Algorithms, Cryptographic Tools - Hash, MAC, Digital Signatures

Mobile Internet and Web Services: WAP Architecture, Wireless Application Environment: Wireless Markup Language, WAP Binary XML Content Format, WML Script, XHTML Mobile Profile, I-Mode, Web Services Architecture: WSDL, ADDI, SOAP, Web Services Security, Web Services For Remote Portals

TEXT BOOKS:

1. Pervasive Computing: The Mobile World By Uwe Hansmann , Lothar Merk, Springer.
2. Pervasive Computing: Technology And Architecture of Mobile Internet Applications
Jochen Burkhardt , Horst Henn , Stefan Hepper , Klaus Rindtorff , Thomas Schaeck

REFERENCE BOOK:

1. Seng Loke, Context-Aware Computing Pervasive Systems, Auerbach Pub., New York, 2007.

SEMANTIC WEB

Theory : 4 Periods
Exam : 3 Hrs.

Sessionals : 30
Ext. Marks : 70
Credits : 4

COURSE OBJECTIVES:

1. To teach the concepts, technologies and techniques underlying and making up the Semantic Web.
2. Understand and use ontologies in the context of Computer Science and the semantic web

COURSE OUTCOMES:

1. Able to understand the rationale behind Semantic web.
2. Understand the concept structure of the semantic web technology and how this technology revolutionizes the World Wide Web and its uses.
3. Able to model and query domain knowledge as ontologies defined using standards such as RDF and OWL.

SYLLABUS

Introduction to Semantic Web: Introduction, Semantic Web, URI, RDF, Ontologies, Inferences, DAML, Semantic Web Languages, Semantic Annotation, Classification, Information Extraction, Ontology Assignment, XML, Syntax of XML, XML Schema, Semantic Web Applications to E-Commerce, E-Government and E-Banking, Semantic Web in Life Sciences, RIF Applications.

Semantic Web Structure: Semantic Web Layers Architecture, Different Layers, Match Making, Multi Information Retrieving, Digital Signature, Semantic Memory, Semantic Web Enabled Service Oriented Architecture (SESA), SESA Services, SESA Middle Ware.

Resource Descriptive Languages RDF: Introduction to RDF, Syntax of RDF, Advanced Feature, Simple Ontologies in RDF Schema, Encoding Special Data Structures, Semantics Model Theoretic Semantics for RDFs, Syntactic Reasoning with Deduction Rules Syntactic Limits of RDFs

Web Ontology Languages: OWL Syntax, OWL Species, OWL2 Standards, OWL Formal Semantics, Description Logics, Model Theoretic Semantics of OWL, SWRL, Semantic Web Rules, Languages, Syntax of SWRL, Rules and Safety, Implementation & Applications.

Ontology Engineering: Requirement Analysis, Ontology Knowledge Creation, Ontologies and Rules: Definition of a Rule, Datalog as First order Rule Language, Combining Rules with OWDL, Rule Interchanging Formats RIF, Quality Assurance of Ontologies, Modular Ontologies, Divide and Conquer, Software Tools.

Ontology Query Languages: Semantic Web Query Languages and Implementations, ROPS (RDF OWL Processing Systems), SWOPS (SWRL Ontology Processing System, Bench Marking Results, SPARQL, Query Languages for RDF, Conjunctive Queries for OWL DL.

Semantic Web Mining: Introduction, Concepts in Semantic Web Mining, XML, RDF & Web Data Mining, Ontologies and Web Data Mining, Agents in Web Data Mining, Web Mining and Semantic Web As a Data Base, semantic Interoperability and Web Mining Web Mining Vs Semantic Web Mining

Semantic Web Tools & Applications: Web Data Exchange and Syndication, Semantic WIKI's, Semantic Portals, Semantic Meta Data in Data formats, Semantic Web Services Modeling Ontologies, Semantic Web Service Design Tools, Ontologies for Standardizations WMO and SWMO Applications

TEXT BOOK:

1. Foundations of Semantic Web Technologies, Pascal Hitzler, Markus Krotzsch, Sebastian Rudolph, CRC Press.

REFERENCE BOOKS:

1. Web Data Mining and Applications in Business Intelligence and Counter Terrorism, Bavani Thuraisingham, CRC Press, June 2003
2. Implementing Semantic Web Services-The SESA Frame Work, D. Fensel;M.Kerrigan; M.Zaremba, Springer
3. Enabling Semantic Web Services- The Web Service Modeling Ontology, Fensel,D; Lausen,H;Pollers,ABruijn,J;Stollberg,M; Spriger
4. A Semantic Web Primer, Paul Groth, Frank van Harmelen, Rinke Hoekstra, The MIT Press2012
5. Programming the Semantic Web, Toby Segaran, Colin Evans, Jamie Taylor Oreilly Publications, July 2009

DATA WAREHOUSING & DATA MINING

Theory	: 4 Periods	Sessionals	: 30
Exam	: 3 Hrs.	Ext. Marks	: 70
		Credits	: 4

COURSE OBJECTIVES:

1. To differentiate OnLine Transaction Processing and OnLine Analytical processing
2. Learn Multidimensional schemas suitable for data warehousing
3. Understand various data mining functionalities
4. To Inculcate knowledge on data mining query languages.
5. To Know in detail about data mining algorithms
6. The objective of this course is to study various techniques involved in data mining, data warehousing.

COURSE OUTCOMES:

1. Extract knowledge using data mining techniques
2. At the closing stage of the course, students will be able to analyze different operations and techniques involved in data mining.

SYLLABUS

Introduction to Data Mining: Evolution of IT into DBMS, Motivation and importance of Data Warehousing and Data Mining, Kinds of Patterns, Technologies, Basic Data Analytics: Data Objects and Attributes Types, Statistical Descriptions of Data, Data Visualization, Estimating Data Similarity and Dissimilarity, Major Issues in Data Mining., Data Mining Applications

Data Warehouse and OLAP Technology: Basic Concepts of Data warehouse, Data Modeling using Cubes and OLAP, DWH Design and usage, Implementation using Data Cubes and OLAPs, Data Generalization with AOI.

Data Mining Primitives & Data Cubes: Data Mining Primitives, Data Mining Tasks, Data Mining Query Language, Designing Graphical user Interfaces based on a Data Mining Query language, Preliminary Concepts of Data Cube Computation, Data Cube Computation Methods: Multi-way Array Aggregation for Full Cube, BUC Computing for Iceberg Cubes, Star-Cubing Using Dynamic Star-Tree Structure, Pre-computing Shell Fragments for Fast High-Dimensional OLAPs.

Data Mining Concept Description: Data Preprocessing: Pre-processing the Data, Data Cleaning, Data Integration, Data Reduction, Data Transformation, Discretization and Concept Hierarchy Generation; Data Architectures of Data Mining Systems; Characterization and Comparison, Concept Description, Data Generalization and Summarization; Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons, Discriminating between Different Classes, Mining Descriptive & Statistical Measures in Large Databases.

Mining Frequent Patterns Based on Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods: Apriori Algorithm, Association Rule Generation, Improvements to A Priori, FP-Growth Approach, Mining Frequent Patterns using Vertical Data Formats, Mining Closed and Max Patterns, Pattern Evaluation Methods

Classification: Basic Concepts, Decision Tree Induction, Bayes Classification, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy
Advanced Methods: Classification by Back Propagation, SVM, Associative Classification, Lazy Learning, Fuzzy Sets, Rough Sets, Genetic Algorithms, Multiclass Classification, Semi-Supervised Classification

Cluster Analysis: Basic Concepts, Types of Data in Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Evaluation of Clustering Solutions

TEXT BOOK:

1. Data Mining- Concepts and Techniques by Jiawei Han, Micheline Kamber and Jian Pei – Morgan Kaufmann publishers ---3rd edition

REFERENCE BOOKS:

1. Data Mining Techniques, A.K.Pujari, University Press Data mining concepts by Tan, Steinbech, and Vipin Kumar - Pearson Edu publishers
2. Data Mining –Introductory and Advanced by Margaret Dunham -- Pearson Education publishers
3. Data Warehousing for Real –world by Sam Annahory-- Pearson Education publishers

NETWORK PROGRAMMING & WEB PROGRAMMING LAB

Lab	: 3 Periods	Sessionals	: 50
Exam	: 3 Hrs.	Ext. Marks	: 50
		Credits	: 2

COURSE OBJECTIVES:

1. To local and remote systems
2. To chat application for communication between the systems
3. To retrieve data from remote system
4. To transfer data, files between the systems.
5. To design and develop applications and Web pages HTML tags, Emphasis on CSS, Servelets, cookies, JSP & EJB.

COURSE OUTCOMES:

1. Student able to design Mail Clients, HTTP server. And also data from remote systems.
2. Students design web pages using html tags.
3. Identify user and content goals of the proposed web site and create functional and formal design specifications for a site.

SYLLABUS**Part I Networks Lab Experiments**

1. Identifying well known ports on a Remote System :By trying to listen to the various well known ports by opening client connections. If the exception does not occur then the remote port is active else the remote port is inactive.
2. Writing a Chat application:
 - i). One-One: By opening socket connection and displaying what is written by one party to the other.
 - ii). Many-Many (Broad cast): Each client opens a socket connection to the chat server and writes to the socket. Whatever is written by one party can be seen by all other parties.
3. Data retrieval from a Remote database: At the remote database a server listens for client connections. This server accepts SQL queries from the client, executes it on the database and sends the response to the client.
4. Mail Client:
 - i). POP Client : Gives the server name , user name and password retrieve the mails and allow manipulation of mail box using POP commands.
 - ii). SMTP Client : Gives the server name, send e-mail to the recipient using SMTP commands-
5. Simulation of Telnet: Provide a user interface to contact well-known ports, so that client-server interaction can be seen by the user.
6. Simple file transfer between two systems (without protocols): By opening socket connection to our server on one system and sending a file from one system to another.
7. TFTP- Client: To develop a TFTP client for file transfer. (Unix Network programming-Stevens.)

8. HTTP-Server: Develop a HTTP server to implement the following commands. GET, POST, HEAD, DELETE. The server must handle multiple clients.

Part II Web Programming Lab Experiments

9. Design of the Web pages using various features of HTML and DHTML

10. Client server programming using servlets, ASP and JSP on the server side and java script on the client side

11. Web enabling of databases

12. Multimedia effects on web pages design using Flash.

REFERENCE BOOKS:

1. Java Network Programming, Harol, Orielly Publications
2. An Introduction to Computer Networking, Kenneth C. Mansfield Jr and James L. Antonakos, Pearson Education Asia
3. Internet and Web Technologies by Raj Kamal, Tata McGraw-Hill
4. Programming the World Wide Web by Robert W. Sebesta, Pearson Education

OBJECT ORIENTED SOFTWARE ENGINEERING LAB
(Common for M.Tech (CST, IT))

Lab	: 3 Periods	Sessionals	: 50
Exam	: 3 Hrs.	Ext. Marks	: 50
		Credits	: 2

COURSE OBJECTIVES:

1. To understand the Object oriented modelling using UML
2. To enable the student to get knowledge in SDLC
3. To give a detailed understanding of processes and techniques for building large object-oriented software systems.
4. To develop skills to evolve object-oriented systems from analysis, to design, to implementation
5. To develop skills to work as a team for developing a software project.
6. Introducing the various design approaches, models and metrics.

COURSE OUTCOMES:

1. Students can design and implement complex software solutions. and test and document software.
2. They are capable of working as part of a software team and develop significant projects

SYLLABUS

1. The purpose of the Software Engineering Lab course is to familiarize the students with modern software engineering methods and tools, Rational Products. The course is realized as a project-like assignment that can, in principle, by a team of three/four students working full time. Typically the assignments have been completed during the semester requiring approximately 60-80 hours from each project team.
2. The goal of the Software Engineering Project is to have a walk through from the requirements, design to implementing and testing. An emphasis is put on proper documentation. Extensive hardware expertise is not necessary, so proportionate attention can be given to the design methodology.
3. Despite its apparent simplicity, the problem allows plenty of alternative solutions and should be a motivating and educating exercise. Demonstration of a properly functioning system and sufficient documentation is proof of a completed assignment
4. Term projects are projects that a group student or might take through from initial specification to implementation. The project deliverables include

Projects

1. Documentation including
 - a. A problem statement
 - b. A requirements document
2. A Requirements Analysis Document.
3. A System Requirements Specification.
4. A Software Requirements Specification.
5. A design document
 - a. A Software Design Description and a System Design Document.
6. A test specification.

7. Manuals/guides for
 - a. Users and associated help frames
 - b. Programmers
 - c. Administrators (installation instructions)
8. A project plan and schedule setting out milestones, resource usage and estimated costs.
9. A quality plan setting out quality assurance procedures
10. An implementation.

REFERENCE BOOKS:

1. Project-based software engineering: An Object-oriented approach, Evelyn Stiller, Cathie LeBlanc, Pearson Education
2. Visual Modelling with Rational Rose 2002 and UML, Terry Quatrini, Pearson Education.
3. UML2 Toolkit, Hans -Erik Eriksson, etc; Wiley.

SEMINAR

Lab : 3 Periods
Exam : 3 Hrs.

Sessionals :100
Credits : 2

The viva-voce for the seminar shall be held with the faculty member, PG coordinator, and Head of the Department. The marks shall be awarded in the ratio of 40, 20 and 40 percent by the members respectively.

DEPARTMENT OF INFORMATION TECHNOLOGY

M.TECH (INFORMATION TECHNOLOGY)

Scheme of Instruction and Examination

(Regulation:R16)

(with effect from **2016-2017** admitted batch onwards)

III SEMESTER

Course Code	Course Title	Credits	Scheme of Examination	Exam Marks	Total Marks
M16 IT 2101	Thesis Work - Preliminary	10	Review	100	100

1. Candidates can do their thesis work within the department or in any industry/research organization for two semesters (i.e. 3rd and 4th semesters). In case of thesis done in an industry/research organization, one advisor (Guide) should be from the department and one advisor (Co-Guide) should be from the industry/research organization.
2. The Thesis Work -Preliminary should be submitted at the end of 3rd semester and it will be evaluated through Review by a committee consisting of Head of the Department, External Examiner, PG coordinator and guide. The marks shall be awarded in the ratio of 20, 40, 20 and 20 percent by the members respectively.

DEPARTMENT OF INFORMATION TECHNOLOGY

M.TECH (INFORMATION TECHNOLOGY)

Scheme of Instruction and Examination

(Regulation:R16)

(with effect from **2016-2017** admitted batch onwards)

IV SEMESTER

Course Code	Course Title	Credits	Scheme of Examination	Exam Marks	Total Marks
M16 IT 2201	Thesis Work-Final	14	Viva-voce	100	100

1. A publication of a paper on the thesis work in a National/International Journal at the end of 4th semester is mandatory for the submission of thesis work.
2. The Thesis should be submitted at the end of 4th semester and it will be evaluated through Viva-Voce examination by a committee consisting of Head of the Department, External Examiner, PG coordinator and thesis guide. The marks shall be awarded in the ratio of 20, 40, 20 and 20 percent by the members respectively.