Karnataka State Open University
Mysore,Karnataka – 570006

In Association with VEDANT

Syllabus
For
Masters of Technology
Information Technology
(M.Tech.-IT)

Masters of Technology-Information Technology (M.Tech-IT)

Semester- I

CODE	SUBJECT	CREDITS
MT11	Interactive Computer Graphics	4
MT12	Advanced Computer Architecture	4
MT13	Algorithm Analysis and Design	4
MT14	Advanced DBMS	4
	Total Credits	**16**

Semester- II

CODE	SUBJECT	CREDITS
MT21	Object oriented Software Engg. With UML	4
MT22	AI and Neural Networks	4
MT23	Elective Paper-I	4
MT24	Elective Paper-II	4
	Total Credits	**16**

Semester- III

CODE	SUBJECT	CREDITS
MT31	Elective Paper -III	4
MT32	Elective Paper -IV	4
MT33	Dissertation - Part I	8
	Total Credits	**16**

Semester- IV

CODE	SUBJECT	CREDITS
MT41	Dissertation - Part II	16
	Total Credits	**16**

Group -A

CODE	SUBJECT	CREDITS
MT23 A	Automata	4
MT24 A	Parallel Computing	4
MT31 A	Logic and Functional Programming	4
MT32 A	Natural Language Processing	4

Group -B

CODE	SUBJECT	CREDITS
MT23 B	Embedded System	4
MT24 B	VLSI Design	4
MT31 B	Simulation and Modelling	4
MT32 B	Computer Design	4

Group- C

CODE	SUBJECT	CREDITS
MT23 C	E-Commerce, M-Commerce and Network Security	4
MT24 C	Network Programming	4
MT31 C	Wireless and Mobile Network	4
MT32 C	ERP and CRM	4

Group-D

CODE	SUBJECT	CREDITS
MT23 D	Multimedia Systems	4
MT24 D	Document Analysis and Pattern Recognition	4
MT31 D	Intelligent Databases	4
MT32 D	Biometrics	4

Note: 1. Candidates have to select any one group for elective papers.

2. First two papers of each group are in second semester and remaining papers are in Third Semester.

Detailed Syllabus

Semester - I

SECTION:I   **Interactive Computer Graphics and Clipping**

Unit-1 Line Drawing and transformation: Basic raster graphical algorithm for 2D primitives.

Unit-2   Line drawing algorithm, 2D and 3D transformation.

Unit-3 Window, Viewport, Clipping algorithm,

Unit-5 Curves and Surfaces: Circle drawing algorithm, Ellipse drawing algorithm.

Unit-6 Bezier curve, b-spline curve, surfaces, Solid modelling

Unit-7 Projection Visible surface determination Parallel projection, Perspective projection.

Unit-8   Computation of vanishing point.

Unit-9 Z-buffer algorithm, Scan line algorithm, Area subdivision algorithm, Raytracing algorithm

Unit-10 Shading Illumination mode, Specular reflection model, Shading models for curve surfaces,.

Unit-11 Radiosity method, Rendering, Recursive ray tracing.

Unit-12 Texture mapping.

Unit-13 Advanced Modelling Techniques.

Unit-14 Procedural Models, Fractal Models, Grammar based models, particle systems.

Unit-15 Animation - 3D animation, morphing.

Unit-16 Simulation of key frames .

Reference Books:-

1. Interactive Computer Graphics: A Top-Down Approach Using OpenGL (5th Edition) - Hardcover (Apr. 3, 2008) by Edward Angel
2. Interactive Computer Graphics: A Top-Down Approach with OpenGL (3rd Edition) - Hardcover (July 16, 2002) by Edward Angel
3. Interactive Computer Graphics: A Top-Down Approach Using OpenGL: AND OpenGL - A Primer - Paperback - Import (July 8, 2004) by Edward Angel

SECTION-II   **Advanced Computer Architecture**

Unit-1 Parallel computer models and Program and network properties The state of computing, Classification of parallel computers, Multiprocessors and multicomputers, Multivector and SIMD computers.

Unit-2 Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism.

Unit-3 Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture.

Unit-4 Demand driven mechanisms, Comparisons of flow mechanisms

Unit-5 System Interconnect Architectures and Advanced processors ,Network properties and routing.

Unit-6 Static interconnection Networks, Dynamic interconnection Networks, Multistage and combining network.

Unit-7 Multiprocessor system Interconnects, Hierarchical bus systems, Crossbar switch and multiport memory.

Unit-8 Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

Unit-9 Pipelining and Memory Hierarchy Design Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining

Unit-10 Dynamic instruction scheduling, Branch Handling techniques, branch prediction.

Unit-11 Arithmetic Pipeline Design, Computer arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines.

Unit-12 Cache basics & cache performance, reducing miss rate and miss penalty, multilevel cache hierarchies. Main memory organizations, design of memory hierarchies.

Unit-13 Multiprocessor architectures and Scalable point – point interfaces. Symmetric shared memory architectures, distributed shared memory architectures.

Unit-14 Models of memory consistency, cache coherence protocols (MSI, MESI, MOESI), scalable cache coherence, overview of directory based approaches.

Unit-15 Design challenges of directory protocols, memory based directory protocols, cache based directory protocols, protocol design tradeoffs, synchronization, Alpha364 and HT protocols, high performance signaling layer.

Unit-16 Enterprise Memory subsystem Architecture**:** Enterprise RAS Feature set: Machine check, hot add/remove, domain partitioning, memory mirroring/migration, patrol scrubbing, fault tolerant system.

Reference Books:-
1. Advanced Computer Architecture: Parallelism, Scalability, Programmability by Kai Hwang (Hardcover - Dec 1, 1992)
2. Advanced Computer Architecture and Parallel Processing (Wiley Series on Parallel and Distributed Computing) (v. 2) by Hesham El-Rewini and Mostafa Abd-El-Barr (Hardcover - Jan 18, 2005)
3. Computer Architecture: A Quantitative Approach, 4th Edition by John L. Hennessy and David A. Patterson (Paperback - Sep 27, 2006)

SECTION –III Algorithm Analysis and Design

Unit-1 Introduction to Algorithm , the role of algorithms in computing.

Unit-2 Asymptotic notation, asymptotic analysis of recurrence relations, probabilistic analysis and randomized

Unit-3 Algorithm, the hiring problem, indicator random variables.

Unit-4 Divide and conquer paradigm – Merge sort, Inversion counting, Dynamic

Unit-5 Programming, Matrix Chain multiplication, Longest Common subsequence, optimal binary search trees.

Unit-6 Greedy Algorithm –Activity Selection problem, Theoretical foundation of greedy algorithm.

Unit-7 Task Scheduling problem , Comparison of dynamic programming and Greedy algorithm with Knapsack as case study.

Unit-8 Graphs: Review of Graphs (Representation, Depth First Search, Breath First search, Kruskal and Prim Algorithm, Dijkstra's Algorithm).

Unit-9 Flow networks: Ford-Fulkerson method, comparison Networks, Zero-one Principle, Bitonic Sorting Network, Merging Network, Sorting Network

Unit-10 Matrix Operation (Properties, Strassen's Algorithm, Solution of linear equation, Matrix inversion).

Unit-11 Polynomial and FFT, Representation of polynomials, The DFT and FFT, efficient FFT implementation.

Unit-12 Number–Theoretic Algorithm, Elementary number-theoretic notion, Greatest common divisor, modular arithmetic.

Unit-13 Solving modular linear equation, the Chinese remainder theorem

Unit-14 NP-Completeness , Polynomial time, Polynomial time verification, NP-completeness and reducibility, NP-Completeness proofs.

Unit-15 Approximation Algorithms- the vertex-cover problem.

Unit-16 The Traveling-Salesman Problem, The set covering problem

Reference Books:-
1. Introduction to the Design and Analysis of Algorithms (2nd Edition) by Anany Levitin (Paperback - Feb 24, 2006)
2. Algorithm Design: Foundations, Analysis, and Internet Examples by Michael T. Goodrich (Paperback - Oct 1, 2001)
3. The Design and Analysis of Algorithms (Monographs in Computer Science) by Dexter Kozen (Hardcover - Dec 3, 1991)

SECTION-III Advanced DBMS

Unit-1 Relational Databases and Query Processing and Optimization, Integrity Constraints revisited, Extended ER diagram.

Unit-2 Relational Algebra & Calculus, Functional, Muiltivalued and Join Dependency, Normal Forms, Rules about functional dependencies.

U**nit-3** Valuation of Relational Operations, Transformation of Relational Expressions. Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.

Unit-4 Deductive Databases, Objected Oriented and Object Relational Databases and Parallel and Distributed Databases

Unit-5 Datalog and Recursion, Evaluation of Datalog program, Recursive queries with negation, Modeling Complex Data Semantics, Specialization, Generalization.

Unit-6 Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases.

Unit-7 Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization.

Unit-8 Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols. Design of Parallel Databases, Parallel Query Evaluation.

Unit-9 Advanced Transaction Processing and Active Database and Real Time Databases. Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions.

Unit-10 Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors, Triggers in SQL

Unit-11 Event Constraint and Action: ECA Rules, Query Processing and Concurrency Control, Compensation and Databases Recovery

Unit-12 Image and Multimedia Databases, WEB Database and Data Mining , Modeling and Storage of Image and Multimedia Data, Data Structures – R-tree, k-d tree, Quad trees.

Unit-13 Content Based Retrieval: Color Histograms, Textures, etc., Image Features, Spatial and Topological Relationships, Multimedia Data Formats, Video Data Model.

Unit-14 Audio & Handwritten Data, Geographic Information Systems (GIS), Accessing Databases through WEB, WEB Servers, XML Databases, Commercial Systems.

Unit-15 Knowledge Representation Using Rules, Association and Classification Rules, Sequential Patterns, Algorithms for Rule Discovery

Unit-16 Data Warehousing Data Warehousing Architecture, Multidimensional Data Model, Update Propagation OLAP Queries.

Reference Books:-
1. Advanced Database Technology and Design (Artech House Computer Library) by Mario Piattini (Hardcover - Aug 31, 2000)
2. An Advanced Treatise On Fixture Design And Planning (Series on Manufacturing Systems and Technology) by A. Y. C. Nee, Z. J. Tao, and A. Senthil Kumar (Hardcover - Dec 28, 2004)
3. Database Transaction Models for Advanced Applications (The Morgan Kaufmann Series in Data Management Systems) by Ahmed K. Elmagarmid (Hardcover - Apr 15, 1992)

Semester II

SECTIOM-I   Object oriented Software Engg. With UML

Unit-1 Introduction to Software Engineering , Software Engineering Development.

Unit-2 Software Life Cycle Models, Standards for developing life cycle models.

Unit-3 Object Methodology & Requirement Elicitation

Unit-4 Introduction to Object Oriented Methodology.

Unit-5 Overview of Requirements Elicitation.

Unit-6 Requirements Model-Action & Use cases, Requirements Elicitation Activities.

Unit-7 Managing Requirements Elicitation

Unit-8 Architecture and Modeling with UML

Unit-9 Model Architecture, Requirements Model, Analysis Model, Design Model, Implementation Model, Test Model.

UNit-10 Basic Building Blocks of UML, A Conceptual Model of UML, Basic Structural Modeling, UML Diagrams

Unit-11 System Analysis and System Design Analysis Model, Dynamic Modelling & Testing, Design concepts & activities, Design models, Block design.

Unit-12 Testing Object Oriented Systems Introduction, Testing Activities & Techniques, The Testing Process, Managing Testing, State Based testing and Data flow testing for Classes.

Unit-13 Component Based Computing, Fundamentals: Definition and nature of components.

Unit-14 Components and interfaces, Interfaces as contracts, the benefits of components.

Unit-15 Basic Techniques: component design and assembly, Relationship with the client-server model and with patterns.

Unit-16 Use of objects and object lifecycle services, use of object

Reference Books:-

1. Object-Oriented Software Construction (Book/CD-ROM) (2nd Edition) - Paperback (Mar. 21, 2000) by Bertrand Meyer
2. Design Patterns: Elements of Reusable Object-Oriented Software - Hardcover (Nov. 10, 1994) by Erich Gamma, Richard Helm, Ralph Johnson, and John M. Vlissides
3. Growing Object-Oriented Software, Guided by Tests - Paperback (Oct. 22, 2009) by Steve Freeman and Nat Pryce

SECTION-III   AI and Neural Networks

Unit-1 Introduction AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality.

Unit-2 The nature of environments, structure of agents, problem solving agents, problem formulation.

Unit-3   Searching Searching for solutions, uniformed search strategies – Breadth first search, depth first Search.

Unit-4 Search with partial information (Heuristic search) Greedy best first search, A* search   Game Playing: Adversial search, Games, minimax, algorithm.

Unit-5 Optimal decisions in multiplayer games, Alpha-Beta pruning. Evaluation functions, cutting of search.

Unit-6 Knowledge Representation & Reasons logical Agents, Knowledge – Based Agents, the Wumpus world.

Unit-7 Logic, propositional logic, Resolution patterns in propos ional logic, Resolution, Forward & Backward. Chaining.

Unit-8 First order logic and Characteristics of Neural Networks.

Unit-9 Inference in first order logic, propositional Vs. first order inference. Unification & lifts forward chaining, Backard chaining, Resolution.

Unit-10   Historical Development of Neural Networks Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology.

Unit-11 Basic Learning Laws, Pattern Recognition Problem, Basic Functional Units, Pattern Recognition Tasks by the Functional Units.

Unit-12 Feed forward Neural Networks and Feedback Neural Networks   Introduction, Analysis of pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of pattern storage Networks.

Unit-13 Analysis of Pattern Mapping Networks, Introduction, Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks.

Unit-14 Competitive Learning Neural Networks & Complex pattern Recognition

Unit-15 Introduction, Analysis of Pattern Clustering Networks

Unit-16 Analysis of Feature Mapping Networks, Associative Memory.

Semester – III (Group A)

SECTION-I   **Automata**

Unit-1 Finite State Machines -Definition, concept of sequential circuits, state table & state assignments, concept of synchronous, asynchronous and liner sequential machines.

Unit-2 Finite State Models ,Basic definition, mathematical representation, Moore versus Mealy m/c, capability & limitations of FSM.

Unit-3 State equivalence & minimization, machine equivalence, incompletely specified machines.

Unit-4 Merger graph & compatibility graph, merger table, Finite memory, definite, information loss less & inverse machines: testing table & testing graph.

Unit-5 Structure of Sequential Machines and Finite Automation Concept of partitions, closed partitions, lattice of closed partitions.

Unit-6 Decomposition: serial & parallel, Preliminaries (strings, alphabets & languages, graphs & trees, set & relations),

Unit-7 Definition, recognition of a language by an automata - idea of grammar, DFA, NFA, equivalence of DFA and NFA, NFA with emoves.

Unit-8 Regular sets & regular expressions : equivalence with finite automata, NFA from regular expressions, regular expressions from DFA.
Unit-9 Two way finite automata equivalence with one way, equivalence of Moore & Mealy machines, applications of finite automata.

Unit-10 Closure Properties of Regular Sets and Context Free Grammars Pumping lemma & its application.

Unit-11 Closure properties minimization of finite automata: minimization by distinguishable pair, Myhill-Nerode theorem, Introduction, definition, derivation trees, simplification, CNF & GNF.

Unit-12 Pushdown Automata and Closure Properties of CFLs -Definition, moves, Instantaneous Descriptions.

Unit-13 Language recognized by PDA, deterministic PDA, acceptance by final state & empty stack.

Unit-14 Equivalence of PDA and CFL, Pumping lemma & its applications, Ogden's lemma, closure properties.

Unit-15 Decision algorithms. Introduction to Z. Regular language properties and their grammars.

Unit-16 Context sensitive languages.

Reference Books:-

1. An Introduction to Formal Language and Automata by Peter Linz (Hardcover - Feb 15, 2006)
2. Automata and Mechanical Toys by Rodney Peppe (Hardcover - Aug 1, 2002)
3. Introduction to Automata Theory, Languages, and Computation (3rd Edition) by John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman (Hardcover - Jul 15, 2006)

SECTION-II   Parallel Computing

Unit-1 Fundamentals of Distributed Computing and Basic Algorithms in Message -Architectural models for distributed and mobile computing systems.

Unit-2 Basic concepts in distributed computing such as clocks, message ordering, consistent global states, and consensus.

Unit-3 Passing Systems, Leader Election in Rings, and Mutual Exclusion in Shared Memory, Fault-Tolerant .

Unit-4 Consensus, Causality and Time. Message Passing: PVM and MPI.

Unit-5   Distributed Operating Systems**,** OS and network operating systems, Distributed File systems.

Unit-6 Middleware, client/server model for computing, common layer application protocols (RPC, RMI, streams).

Unit-7 Distributed processes, network naming, distributed synchronization and distributed object-based systems.

Unit-8 A Formal Model for Simulations, Broadcast and Multicast, Distributed Shared Memory, Fault-Tolerant.

Unit-9 Simulations of Read/Write Objects Simulating Synchrony.

Unit-10 Improving the Fault Tolerance of Algorithms, Fault-Tolerant Clock Synchronization.

Unit-11 Distributed Environments Current systems and developments (DCE, CORBA, JAVA).

Unit-12 Advanced Topics , Randomization, Wait-Free Simulations of Arbitrary Objects, Problems Solvable in Asynchronous Systems.

Unit-13 Solving Consensus in Eventually Stable Systems, High Performance Computing-HPF, Distributed and mobile multimedia systems.

Unit-14 Adaptability in Mobile Computing. Grid Computing and applications. Fault tolerant Computing Systems.

Unit-15 Parallel Processing Basic Concepts, Introduction to parallel processing, parallel processing terminology.

Unit-16 Parallel & Distributed Programming: Parallel Programming environments

Reference Books:-

1. Introduction to Parallel Computing (2nd Edition) by Ananth Grama, George Karypis, Vipin Kumar, and Anshul Gupta (Hardcover - Jan 26, 2003)

2. The Sourcebook of Parallel Computing (The Morgan Kaufmann Series in Computer Architecture and Design) by Jack Dongarra, Ian Foster, Geoffrey C. Fox, and William Gropp (Hardcover - Nov 25, 2002)
3. Parallel Programming: for Multicore and Cluster Systems by Thomas Rauber and Gudula Rünger (Hardcover - Mar 10, 2010)

SECTION-III   Logic and Functional Programming

Unit-1   Programming Domains, Language evaluation

Unit-2 Evolution of major programming languages.

Unit-3 Describing Syntax and Semantics.

Unit-4 Formal methods of Describing Syntax and semantics. Backus Naur Form. Attribute grammars.

Unit-5 Describing semantics - Denotational semantics.

Unit-6 Data types and ariables - Names - variables .Scope and lifetime.

Unit-7 Expression and assignment Statements.

Unit-8 Control structures. Subprograms - parameter passing - overloading - generic subprograms.

Unit-9 Data abstraction and Encapsulation. Polymorphism and inheritance.

Unit-10 Features of object oriented Languages. Smalltalk, C++ and JAVA.

Unit-11 Design and implementation issues.

Unit-12. Exception handling. Constructs for concurrency

Unit-13 Functional programming languages Lambda calculus- Introduction to pure LISP.

Unit-14 Applications of functional programming languages.

Unit-15 Logic programming languages A brief introduction to predicate calculus - Horn clauses - Logic programming]

Unit-16. Introduction to prolog. Applications of Logic programming.

Section-IV   Natural Language Processing

Unit-1   Natural Language Processing, Introduction to Natural Language Understanding

Unit-2 The study of Language, Applications of NLP.

Unit-3 Evaluating Language Understanding Systems. Different levels of Language Analysis

Unit-4 Representations and Understanding, Organization of Natural language Understanding System

Unit-5 Linguistic Background: An outline of English syntax.

Unit-6 Introduction to semantics and knowledge representation, Some applications like machine translation, database interface.

Unit-7. Grammars and Parsing: Grammars and sentence Structure.

Unit-8 Top-Down and Bottom-Up Parsers.

Unit-9 Transition Network Grammars, Top- Down Chart Parsing.

Unit-10 Feature Systems and Augmented

Unit-11 Grammars: Basic Feature system for English,

Unit-12 Parsing with Features, Augmented Transition Networks,

Unit-13 Morphological Analysis and the Lexicon,

Unit-14 Grammars for Natural Language: Auxiliary Verbs and Verb Phrases.

Unit-15 Movement Phenomenon in Language,

Unit-16 Handling questions in Context-Free Grammars.

Reference Books:-

1. Foundations of Logic and Functional Programming Workshop: Proceedings (Lecture Notes in Computer Science) by M. Boscarol, L. Carlucci Aiello, and G. Levi (Paperback - Jul 1988)
2. Foundations of Logic and Functional Programming: Workshop, Trento, Italy, December 15-19, 1986. Proceedings (Lecture Notes in Computer Science) by Mauro Boscarol, Luigia Carlucci Aiello, and Giorgio Levi (Paperback - Jun 1, 1988)

Semester – III (Group B)

SECTION-III   Embedded System

Unit-1 Introduction Defining Real time systems.

Unit-2 Designing and Developing Real-time Systems.

Unit-3 Embedded Real Time Systems. Special Characteristics of real time systems, a brief evolutionary history.

Unit-4 Hardware Architectures of Real Time systems.

Unit-5 Real-Time Devices, Event driven activities.

Unit-6 Timers and Real-time Facilities, I/O Devices and Buses.

Unit-7 Serial devices and parallel devices, Peripheral serial buses

Unit-8 Software architectures interrupts and Exceptions, Concepts of interrupt driven activation,

Unit-9 Need for real time monitor, pseudo parallelism, meeting of dead lines & real time constraints9

Unit-10 Implementation model Overview of WARD & MELLOR Methodology: Ward & Mellor Life Cycle.

Unit-11 The essential model step, the, real time extensions of DFD

Unit-12 Real time languages overview of ADA/Java Extension and Real time Operating Systems.

Unit-13 Multitasking in Real-Time Systems.

Unit-14 Scheduling, Synchronization, Inter-task communication.

Unit-15 Networking, Embedded devices and networks.

Unit-16 System Development Methodologies

Reference Books:-

1. Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers (Embedded Technology) by Tammy Noergaard (Hardcover - Feb 24, 2005)
2. Embedded Systems: Architecture, Programming and Design, 2nd Edition by Raj Kamal (Paperback - Mar 9, 2009)
3. Programming Embedded Systems: With C and GNU Development Tools, 2nd Edition by Michael Barr and Anthony J. Massa (Paperback - Oct 1, 2006)

Section-II   VLSI Design

Unit-1   Introduction to Transistor Theory BJT, FET, CMOS

Unit-2 Logic Design with MOSFETs MOSFET as switches, Complex Logic gates in CMOS.

Unit-3 Transmission Gate Circuits, Clocking and Dataflow control.

Unit-4 Physical Structure of CMOS Integrated circuits, Fabrication Structure of CMOS Integrated Circuits,

Unit-5 Elements of Physical Design: Layout of basic structures, Cell concepts.

Unit-6 FET sizing and the unit transistor, Physical design of Logic gates.

Unit-7 Electrical Characteristics of MOSFETs FET RC Model, Modeling of Small MOSFETs.

Unit-8 Electronic analysis of CMOS Logic gates: DC characteristics of the CMOS inverter, inverter switching characteristics, power dissipation.

Unit-9 Dc characteristics: AND and NOR gates, NAND and NOR transient response.

Unit-10 Analysis of Complex Logic gates, gate design for transient performance.

Unit-11 transmission gates and pass transistors, gate delays, driving large capacitive loads

Unit-12 System-level physical design, Large scale physical design,

Unit-13 Interconnect delay modeling, crosstalk, interconnect scaling, Floorplanning and Routing.

Unit-14 Input and Output Circuits, Power distribution and consumption.

Unit-15 VLSI Clocking and System Design, Clocked Flip-flops, CMOS clocking styles, pipelined systems.

Unit-16 Clock generation and distribution and distribution.

Reference Books:-

1. CMOS VLSI Design: A Circuits and Systems Perspective (4th Edition) by Neil H. E. Weste and David Harris (Hardcover - Mar 11, 2010)
2. Digital Integrated Circuit Design: From VLSI Architectures to CMOS Fabrication by Hubert Kaeslin (Hardcover - Apr 28, 2008)
3. Chip Design for Submicron VLSI: CMOS Layout and Simulation by John P. Uyemura (Hardcover - Feb 8, 2005)

SECTION-III   Simulation and Modeling

Unit-1   Basic Simulation Modeling, The Nature of Simulation   Systems,

Unit-2 Models, and Simulation Discrete-Event Simulation

Unit-3 Simulation of a Single-Server Queueing Alternative Approaches to Modeling and Coding Simulations,

Unit-4 Parallel and Distributed Simulation,Simulation across the Internet and Web-Based Simulation

Unit-5 Steps in a Sound Simulation Study ,Other Types of Simulation : Continuous Simulation Combined,Discrete-ContinuousSimulation

Unit-6   Monte Carlo Simulation. Advantages, Disadvantages, and Pitfalls of Simulation

Unit-7 Modeling Complex Systems Introduction, List Processing in Simulation.

Unit-8 Approaches to Storing Lists in a Computer Linked Storage Allocation

Unit-9 A Simple Simulation Language: simlib. Single-Server Queueing Simulation with simlib Time-Shared Computer Model.

Unit-10   Simulation Software Comparison of Simulation Packages with Programming

Unit- 11 Languages Classification of Simulation Software

Unit-12 General-Purpose Simulation Packages Object-Oriented Simulation

Unit-13 Job-Shop Model Efficient Event-List Manipulation

Unit-14 Building Valid credible, and Appropriately Detailed Simulation Models.

Unit-15 Experimental Design, Sensitivity Analysis

Unit-16 Optimization Simulation of Manufacturing Systems

Reference Books:-

1. Simulation Modeling and Analysis by Averill M. Law (Paperback - Aug 1, 2006)
2. Principles of Modeling and Simulation: A Multidisciplinary Approach by John A. Sokolowski and Catherine M. Banks (Hardcover - Feb 9, 2009)
3. Simulation Modeling and Analysis with Expertfit Software by Averill Law (Hardcover - Jul 21, 2006)

SECTIOM-IV   Computer Design

Unit-1   Fundamentals of Computer design

Unit-2 Technology trends- cost- measuring and reporting performance quantitative principles of computer design.

Unit-3   Instruction set principles and examples classifying instruction set- memory addressing.

Unit-4   Type and size of operands- addressing modes for signal processing-operations in the instruction

Unit-5   Set- instructions for control flow- encoding an instruction set.-the role of compiler

Unit-6   Instruction level parallelism (ILP) over coming data hazards- reducing branch costs –high performance

Unit-7 Instruction delivery- hardware based speculation- limitation of ILP.

Unit-8 ILP software approach- compiler techniques- static branch protection.

Unit-9 VLIW approach- H.W support for more ILP at compile time- H.W verses S.W solutions

Unit-10 Memory hierarchy design cache performance- reducing cache misses penalty and miss rate .

Unit-11   Virtual memory- protection and examples of VM.

Unit-12 Multiprocessors and thread level parallelism

Unit-13 Symmetric shared memory architectures.

Unit-14 Distributed shared memory- Synchronization- multi threading.

Unit-15 Storage systems- Types – Buses - RAID- errors and failures.

Unit-16 Bench marking a storage device- designing a I/O system.

Reference Books:-

1. Simulation Modeling and Analysis by Averill M. Law (Paperback - Aug 1, 2006)
2. Principles of Modeling and Simulation: A Multidisciplinary Approach by John A. Sokolowski and Catherine M. Banks (Hardcover - Feb 9, 2009)
3. Simulation Modeling and Analysis with Expertfit Software by Averill Law (Hardcover - Jul 21, 2006)

Semester – III (Group C)

SECTION-I   E-Commerce, M-Commerce and Network Security

Unit-1   Introduction to E-Commerce Forces behind E-Commerce, E-Commerce Industry Framework.

Unit-2   Brief History of E-Commerce.Inter Organizational E-Commerce.

Unit-3   Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, Architectural framework

Unit-4   Intro to E-Commerce Network Infrastructure for E-Commerce.

Unit-5   Market forces behind I-way, Component of I Way, Access Equipment,

Unit-6   Global Information Distribution Network, Broadband Telecommunication.

Unit-7   Introduction to Mobile (M) Commerce Mobile Computing Application

Unit-8   Wireless Application Protocols, WAP Technology, Mobile Information Devices

Unit-9   Emerging applications, different players in m-commerce, m-commerce life cycle.

Unit-10 Introduction to Network Security Firewalls & Transaction Security.

Unit-11 Client Server Network, Emerging Client Server Security Threats, Firewalls & Network Security.

Unit-12 World Wide Web & Security Encryption, Transaction security, Secret Key Encryption.

Unit-13 Public Key Encryption, Virtual Private Network (VPM), Implementation Management Issues, Overview of

Unit-14 Electronics payment, Digital Token based Electronics Payment System

Unit-15 Smart Cards, Credit Card/Debit Card based EPS, Emerging financial Instruments.

Unit-16 Home Banking, Online Banking.

Reference Books:-

1. E-Commerce: A Control and Security Guide by Gordon E. Smith (Hardcover - Dec 19, 2003)
2. E-commerce Security Strategies: Protecting the Enterprise by Debra Cameron (Paperback - Aug 1998)
3. E-Commerce Security: Weak Links, Best Defenses by Anup K. Ghosh (Paperback - Jan 21, 1998)

SECTION-II   Network Programming

Unit-1 Introduction TCP/IP Architecture, TCP/IP addressing, services, FTP, SMTP, TFTP, SNMP.

Unit-2 Network file system, domain name system.

Unit-3 Transport layer protocols, user datagram protocol, transmission control protocol.

Unit-4 Interprocess communications

Unit-5 File and record locking, pipes, FIFO's.

Unit-6 Stream and messages, message quues, samphorers.

Unit-7 Sockets Sockets system cells, reserved parts,

Unit-8 Stream pipes, socket option.

Unit-9 asynchronous I/O, Sockets and signals

Unit-10 Transport Lay Interface Elementary TLI functions.

Unit-11 Stream and stream pipes.

Unit-12 Asynchronous I/O I/O multiplexing

Unit-13 Remote Procedure calls

Unit-14 Remote login

Unit-15 remote command execution

Unit-16 External data representation.

Reference Books:-

1. Windows Sockets Network Programming (paperback) by Bob Quinn and David Shute (Paperback - Dec 6, 2010)
2. Effective TCP/IP Programming: 44 Tips to Improve Your Network Programs by Jon C. Snader (Paperback - May 14, 2000)
3. Java Network Programming, Third Edition by Elliote Harold (Paperback - Oct 2004)

SECTION-III   **Wireless and Mobile Network**

Unit-1   Introduction to Personal Communication Services (PCS)

Unit-2 PCS architecture, Mobility management, Networks signaling.

Unit-3   Global system for Mobile Communication (GSM) system overview GSM Architecture

Unit-4 Mobility Management, Network signaling.

Unit-5   General Packet Radio Services (GPRS)**:** GPRS architecture, GPRS Network nodes.

Unit-6   WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Unit-7 Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols.

Unit-8-Wireless Markup Languages (WML)

Unit-9   Third Generation (3G) Mobile Services.

Unit-10   Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision.

Unit-11   Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000.

Unit-12   Quality of services in 3G.

Unit-13 Wireless local Loop (WLL)

Unit-14   Introduction to WLL architecture.

Unit-15 WLL technologies, Global Mobile Satellite Systems: Case studies of IRIDIUM and GLOBALSTAR systems.

Unit-16 Bluetooth technology and Wi-Max

Reference Books:-

1. Wireless and Mobile Network Architectures by Yi-Bing Lin and Imrich Chlamtac (Paperback - Oct 10, 2000)
2. Security in RFID and Sensor Networks (Wireless Networks and Mobile Communications) by Paris Kitsos (Hardcover - Apr 13, 2009)
3. Game Theory for Wireless Communications and Networking (Wireless Networks and Mobile Communications) by Yan Zhang and Mohsen Guizani (Hardcover - Aug 15, 2010

SECTION-IV   ERP and SCM

Unit-1 ERP (Enterprise Resource Management): ERP Overview, Benefit

Unit-2 Business Process Reengineering, Data ware Housing, Data Mining.

Unit-3 LAP ERP -A Manufacturing Perspective, ERP Module, ERP Market, ERP implementation life cycle. Options of various paradigms.

Unit-4 Identification of suitable platforms, Role of SDLC/SSAD, Object oriented architecture.

Unit-5 ERP Implementation, Hidden costs, Vendors, Consultant Employees,

Unit-6 Human Resource, ERP & E-Commerce, Future Directives- in ERP**.**

Unit-7 ERP and Internet, Critical Factors guiding selection and evaluation.

Unit-8 Strategies for successful implementation, Impediments and initiatives to achieve success,

Unit-9 Critical success and failure factors, Integrating ERP into organizational culture.

Unit-10 Using ERP tool either SAP or ORACLE format to case study.

Unit-11 SCM (Supply Chain Management):   What is a Supply Chain; Decision phases in a supply Chain; Pro0cess view of a Supply Chain;

Unit-12 The importance of Supply Chain Flows; Examples of Supply Chains. Competitive and Supply Chain strategies; Achieving strategic fit; Expanding strategic scope.

Unit-13 Supply Chain drivers and Obstacles, Designing Distribution Network, Network Design, Demand Forecasting

Unit-14 Aggregate Planning, Inventory Management, Transportation

Unit-15 Pricing and Revenue Management, IT.

Unit-16 Internet and Supply Chain

Reference Books:

1. International Human Resource Management: Managing People in a Multinational Context by Peter Dowling, Marion Festing, and Allen Engle (Paperback - Dec 28, 2007)
2. International Human Resource Management (Global HRM) by Randall S. Schuler, Dennis R. Briscoe, and Lisbeth Claus (Hardcover - Oct 27, 2008)
3. Supply Chain Management Based on SAP Systems: Architecture and Planning Processes (SAP Excellence) by Gerhard F. Knolmayer, Peter Mertens, Alexander Zeier, and Jörg Thomas Dickersbach (Hardcover - Feb 13, 2009)

Semester – III (Group D)

SECTION-I   Multimedia Systems

Unit-1 Introduction, Media and Data Streams, Audio Technology, Multimedia Elements; Multimedia Applications; Multimedia Systems Architecture.

Unit-2 Evolving Technologies for Multimedia Systems; Defining Objects for Multimedia Systems; Multimedia Data Interface Standards, The need for Data Compression; Multimedia Databases,

Unit-3 Media : Perception Media, Representation Media, Presentation Media, Storage Media, Transmission Media, Information Exchange Media, Presentation Spaces & Values,

Unit-4 Presentation Dimensions; Key Properties of a Multimedia System : Discrete & Continuous Media, Independence Media, Computer Controlled Systems, Integration; Characterizing Data Streams.

Unit-5 Asynchronous Transmission Mode, Synchronous Transmission Mode, Isochronous Transmission Mode; Characterizing Continuous Media Data Streams, Sound: Frequency, Amplitude, Sound Perception and Psychoacoustics; Audio Representation on Computers; Three Dimensional Sound Projection; Music and MIDI Standards; Speech Signals; Speech Output; Speech Input; Speech Transmission.

Unit-6 Graphics and Images, Video Technology, Computer-Based Animation Capturing Graphics and Images Computer Assisted Graphics and Image Processing; Reconstructing Images; Graphics and Image Output Options, Basic.

Unit-7 Television Systems; Digitalization of Video Signals; Digital Television; Basic Concepts; Specification of Animations; Methods of Controlling Animation; Display of Animation; Transmission of Animation; Virtual Reality Modeling Language.

Unit-8 Data Compression and Optical Storage Media **s** torage Space; Coding Requirements; Source, Entropy, and Hybrid Coding.

Unit-9 Basic Compression Techniques; JPEG: Image Preparation, Lossy Sequential DCT-based Mode, Expanded Lossy DCT-based Mode, Lossless Mode, Hierarchical Mode, H.261 (Px64) and H.263: Image Preparation.

Unit-10 Coding Algorithms, Data Stream, H.263+ and H.263L; MPEG: Video Encoding, Audio Coding, Data Stream, MPEG-2, MPEG-4, MPEG-7; Fractal Compression, History of Optical Storage; Basic Technology; Video Discs and Other WORM.

Unit-11; Compact Disc Digital Audio; Compact Disc Read Only Memory; CD-ROM Extended Architecture; Further CD-ROM-Based Developments; Compact Disc Recordable; Compact Disc Magneto-Optical; Compact Disc Read/Write; Digital Versatile Disc.

Unit-12 Content Analysis and Multimedia Application Design **,** Simple Vs. Complex Features;

Unit-13 Analysis of Individual Images; Analysis of Image Sequences; Audio Analysis; Applications.

Unit-14 Multimedia Application Classes; Types of Multimedia Systems Virtual Reality Design.

Unit-15 Components of Multimedia Systems. Organizing Multimedia Database.

Unit-16 Application Workflow Design Issues; Distributed Application Design Issues.

Reference Books:-

1. Multimedia Systems: Algorithms, Standards, and Industry Practices by Parag Havaldar and Gerard Medioni (Paperback - Jul 21, 2009)
2. Multimedia Systems by Ralf Steinmetz and Klara Nahrstedt (Paperback - Feb 19, 2010)
3. Multimedia Systems (Siggraph Series) by John F. Koegel Buford (Hardcover - May 1994)

SECTION-II   Document Analysis and Pattern Recognition

Unit-1 Introduction to pattern recognition Systems, design cycles, learning and adaptation

Unit-2 Bayerian decision theory, minimum error-rate classification, classifiers.

Unit-3 discriminant functions and decisions surfaces, Maximum – Likelihood and bayerian parameter estimation, bayerian parameter estimation.

Unit-4 Guarian case and general theory, problems of dimeusability, Hidden marker models, Nonparameter Techniques

Unit-5 Density estimation parazen windows, Kn – Nearest neighbor.

Unit-6 Estimation, The nearest neghlaur, rode,

Unit-7 Metris and nearest – neghron, classification, fuzzy classification, approximation by series expansions.

Unit-8   Linear Discriminant functions**:** Linear discriminant functions and decision surfaces, generadized linear discrminant functions

Unit-9 The two category unicorly separate case, minimizing the perception criterion function**.**

Unit-10 Relaxation procedures, nonrepersable behaviour, Minimum squared-error procedures, The Ho – Kashyap Procedures, support vexter machines, multicategory generatization.

Unit-11 Multilayer Neural Networks, Feed forward operations and classifications

Unit-12 Back propagation algorithm, error factors, back propagation as feature & mapping, back propagation,

Unit-13 Bayer theory and probability, practical techniques for improving back propagation, regularization, complexity adjustment and pruning.

Unit-14 Stochastic methods Stochastic search, Boltzman learning, boltzman networks of graphical models, evolutionary methods, genetic progrance.

Unit-15 Unsuperversed learning and clustering mixture densities and identificability, maximum, likelihood estimation, application to normal mixtures, unemperouses, Bayerian Learning

Unit-16 Data descriptions and controls, criterion function for clusterian, interface, optimization, hierarchical clustering, component analysis, low dimensial representation and multidimensional scaling.

Reference Books:

1. Pattern Recognition and Image Analysis: Second Iberian Conference, IbPRIA 2005, Estoril, Portugal, June 7-9, 2005, Proceedings, Part 1 (Lecture Notes in ... Pattern Recognition, and Graphics) (Pt. 1) by Jorge S. Marques, Nicolás Pérez de la Blanca, and Pedro Pina (Paperback - Jul 21, 2005)
2. Pattern Recognition and Image Analysis: Second Iberian Conference, IbPRIA 2005, Estoril, Portugal, June 7-9, 2005, Proceeding, Part II (Lecture Notes in ... Pattern Recognition, and Graphics) (Pt. 2) by Jorge S. Marques, Nicolás Pérez de la Blanca, and Pedro Pina (Paperback - Jul 21, 2005)

SECTION-III   Intelligent Database

Unit-1   Relational Databases Integrity Constraints revisited, Extended ER diagram.

Unit-2 Relational Algebra & Calculus, Functional, Muiltivalued and Join Dependency, Normal Forms, Rules about functional dependencies.

Unit-3 Query Processing and Optimization, Valuation of Relational Operations, Transformation of Relational Expressions.

Unit-4 Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.

Unit-5   Deductive Databases Datalog and Recursion, Evaluation of Datalog program

Unit-6 Recursive queries with negation, Objected Oriented and Object Relational Databases

Unit-7 Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association

Unit-8 Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Unit-9   Parallel and Distributed Databases Distributed Data Storage – Fragmentation & Replication.

Unit-10 Location and Fragment Transparency Distributed Query Processing and Optimization

Unit-11 Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.

Unit-12 Advanced Transaction Processing Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors

Unit-13 Active Database and Real Time Databases and WEB Database Triggers in SQL, Event Constraint and Action: ECA Rules, Query Processing and Concurrency Control

Unit-14   Compensation and Databases Recovery, Accessing Databases through WEB, WEB Servers, XML Databases, Commercial Systems.

Unit-15 Data Mining and Data Warehousing, Knowledge Representation Using Rules, Association and Classification Rules, Sequential Patterns, Algorithms for Rule Discovery,

Unit-16 Data Warehousing Architecture, Multidimensional Data Model, Update Propagation OLAP Queries.

Reference Books:

1. Building Intelligent Databases with Oracle PL/SQL (Bk/CD) (2nd Edition) by Kevin T. Owens (Paperback - Jan 1998)
2. Intelligent Image Database Systems (Series on Software Engineering and Knowledge Engineering) by S. K. Chang, Erland Jungert, and Genoveffa Tortora (Hardcover - Jul 1996)
3. Intelligent Database Systems by Elisa Bertino, Gian Piero Zarri, and Barbara Catania (Paperback - Feb 8, 2001)

SECTION IV Biometrics

Unit-1 Introduction Benefits of biometric security
Unit-2 Verification and identification – Basic working of biometric matching.
Unit-3 Accuracy – False match rate – False non-match rate – Failure to enroll rate
Unit-4 Derived metrics – Layered biometric solutions.
Unit-5   Finger scan Features – Components – Operation (Steps)
Unit-6 Competing finger Scan technologies – Strength and weakness
Unit-7. Types of algorithms used for interpretation, Iris Scan - Features – Components
Unit-8 Operation (Steps) – Competing iris Scan technologies – Strength and weakness.
Unit-9 Voice Scan Features – Components – Operation (Steps) – Competing voice Scan (facial) technologies
Unit-10 Strength and weakness, Other physiological biometrics
Unit-11 Hand scan – Retina scan – AFIS (Automatic Finger Print Identification Systems)
Unit-12 Behavioral Biometrics – Signature scan- keystroke scan.
Unit-13 Biometrics Application Biometric Solution Matrix .
Unit-14 Bio privacy – Comparison of privacy factor in different biometrics technologies Designing privacy sympathetic biometric systems.
Unit-15. Biometric standards – (BioAPI , BAPI) – Biometric middleware, Biometrics for Network Security
Unit-16. Statistical measures of Biometrics. Biometric Transactions.

Reference Books:-

1. Handbook of Biometrics by Anil K. Jain, Patrick Flynn, and Arun A. Ross (Hardcover - Oct 29, 2007)
2. Biometrics For Dummies by Peter H. Gregory and Michael A. Simon (Paperback - Jul 28, 2008)
3. Biometric Technologies and Verification Systems by John R. Vacca (Paperback - Mar 30, 2007)

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