

Syllabus of MCA + BCA Integrated

I Semester

IMC-111: Computer Fundamentals

Unit I

Introduction to Computers & Number System: What is Computers, History & Generation of Computer, Characteristics, Capabilities and Limitations, Computer Hardware, Computer Software, Types of Computer, Computer Applications, A Simple Model of a Computer, Stages of Data Processing Information Concept & Processing:-Evolution of Information Technology, Data, Field, Rerecord, File, Information, Knowledge & Wisdom. Data Representation: How does Computer Represents the Data? Bits and Bytes, Number systems, Binary System, Number System Conversions, Binary Addition, 2's Compliment Representation, Binary Subtraction, **Binary Multiplication, Binary Division**, ASCII,BCD and EBCDIC Coding.

Unit II

Components of a Computer System: Block Structure of CPU, Memory Unit, Control Unit, ALU, Input/output Functions and Characteristics. Memory Unit: **Memory Cell, Memory Organization**, Computer Memory (Concept of Primary & Secondary Memory, RAM, ROM, types of ROM, Flash Memory, Cache Memory). **Input & Output Devices: Description of Computer Input Units:** Computer Keyboard, Pointing Devices: Mouse, Trackball, Touch Panel, and Joystick, Light Pen, Touch-sensitive Screens Scanners, **Computer Output Units:** Monitors, Various Types of Monitors, Impact and Non-Impact Printers, Plotters, Optical Recognition System, Pen based systems, Digitizers, MICR, OCR, OMR, Bar-code Reader, Digital Camera.

Unit III

Operating System: Concept of Operating System as Resource Manager, Types of Operating System, Batch Processing, Multiprogramming, Multiprocessing, Time Sharing and Real time System, CLI & GUI Interface, Function of Operating System, Batch Files, EXE files, com files etc, Booting, Buffering etc

Unit IV

Software Concepts: Software Concepts, Types of Software: System Software, Application software. Utility Software, Firmware, Compiler, Interpreter and Assembler, **Languages Software:** High Level Languages and Low Level Languages. Computer Virus: Definition, types of Viruses, Characteristics of Viruses, Anti-Virus Software.

Unit V

Introduction to Networking & Internet: Computer and Communication System, Data transmission - Simplex, Half duplex, Full Duplex, Introduction to Computer Networks and their Terminologies, Communication Channel, Modem, Type of Network, Network Topologies, Switching Techniques, Internet: Network, Client and Servers, Host & Terminals, TCP/IP, World Wide Web, Hypertext, Uniform Resource Locator, Web Browsers, IP Address, Domain Name, Internet Services Providers, Internet Security, Internet Requirements, Web Search Engine, Net Surfing, Internet Services, Telnet, E-mail, Intranet.

Suggested Readings:

1. V. Rajaraman, "Fundamental of Computers", B.P.B. Publications.
2. P. K. Sinha, "Fundamental of Computers".
3. Suresh Basandra, "Computer Today".
4. Sumitabha Das, "Unix Concepts and Application".
5. Steve Sagman, "MS- Office 2000(For Windows)".
6. V. Rajaraman, "Fundamental of Computers", PHI Publications, 3rd Edition, 2004.
7. Nasib S. Gill, "Essential of Computer & Network Technology", Khanna Publications, 2nd Edition, 2008.
8. Deepak Bharihoke, "Fundamental of Information Technology", Excel Books, 3rd Edition, 2009.

IMC-112: Programming Concepts using 'C'

Unit I

MS DOS: Introduction, Files and Directories, Internal and External Commands, Batch Files, Evolution of Programming Languages, Top-down Vs Bottom-up Approaches, Algorithm and Flowchart, Source Code, Object Code and Executable File, Introduction to C, Data Types: Primitive, Derived and User-Defined Data Types, Operators, Different Types of Operators, Precedence of Operators, Expression and Statements, Types of Statements.

Unit II

Tokens: Variables, Constants, Literals, Identifiers and Keywords, Escape Sequences, Typecasting, Decision Control Structures: if-else, nested if(), if() ladder, switch-case statement, Iterative statements: for loop, while loop and do-while() loop, Conditional statement, break and continue, Storage Classes.

Unit III

Array: Declaration and Initialization of Array, Two-Dimensional Array, Address Calculation of an Element of a 2-D Array, Functions: Library and User-Defined Functions, Actual and Formal Arguments, Function Declaration, Prototype and Function Definition, Passing Arrays as Parameters, Methods to Call a Function: Call by Value and Call by Reference.

Unit IV

Pointers: Declaration of Pointer Variables, Pointer Arithmetic, Returning Multiple Output Values through a Function Strings, Structures and Unions, Array of Structures, Enumerations.

Unit V

File Handling: Opening and Closing a File, File-Opening Modes, Reading from and Writing to a File, Copying Content of an Existing File to another Command Line Arguments, argc and argv Parameters, Preprocessor Directives.

Suggested Readings:

1. Brian W. Kernighan and Dennis M. Ritchie, "The C programming Language", Prentice-Hall Publications.
2. E. Balagurusamy, "Programming in ANSI C", McGraw Hill Publications.
3. Y. P. Kanitkar, "Let us C", BPB Publications.

IMC-113: Digital Electronics

Unit I

Number System: Binary, Octal, Decimal, Hexadecimal, Number Base Conversions, Complements, Signed Binary Numbers, Binary Arithmetic, Binary Codes- Weighted, Non Weighted, Gray Code, Excess-3 Code, Error Detection Codes, Hamming Code.

Unit II

Boolean Algebra: Boolean Postulates, De-Morgan's Theorem, Boolean Function, Minimization of Boolean Expressions, SOP, POS, Canonical Forms, Karnaugh Map Minimization, Don't Care Condition, Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR, Implementations of Logic Functions using Gates, NAND- NOR Implementations, Multilevel gate Implementations.

Unit III

Combinational Circuits: Adders, Subtractors, Magnitude Comparator, Multiplexer, De-Multiplexer, Encoder, Decoder, Parity Checker & Generator, Code Converter, Implementation of Combinational Logic using MUX, ROM, PAL, PLA. **Sequential Circuit:** Introduction, Flip Flops- SR, JK, T, D, Master Slave- Characteristic Table & Equation, Edge Triggering, Level Triggering, State Diagram, State Table, State Reduction, State Assignment, Excitation Table, Flip Flop Conversions, Design of Sequential Circuit.

Unit IV

Register: Introduction of Registers, Classification of Registers, Register with Parallel Load, Shift Registers, Bidirectional Shift Register with Parallel Load, Serial Adder.

Unit V

Counters: Introduction, Asynchronous/Ripple Counters, Synchronous Counters, BCD Counter, 4-bit Binary Counter with Parallel Load Design of Synchronous Counters, Ring Counter, Johnson Counter.

Suggested Readings:

1. M. Mano, "Digital Logic and Computer Design", 2nd Edition, PHI.
2. R. P. Jain, "Modern Digital Electronics", Tata Mc Graw Hill, 2003.
3. P. Raja, "Switching Theory", Fourth Edition, Umesh Publication.
4. J. S. Katre, "Digital Electronics", Tech-Max Publications, Pune.

IMC-114: Mathematics I

Unit I

Determinants: Definition, Minors, Cofactors, Properties of Determinants. **Matrices:** Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramers Rule, Rank of Matrix Dependence of Vectors, Eigen Vectors of a Matrix, Caley-Hamilton Theorem

Unit II

Differential Calculus: Successive Differentiation, Leibnitz's theorem, Taylor's Series, Maclaurin's series, Rolle's Theorem, Mean value theorem, Maxima and Minima, Point of Inflexion.

Unit III

Tangent and Normals of simple curve, Partial Differentiation, Definition and examples of Curvature, Asymptotes, Tracing of Curves.

Unit IV

Integral Calculus: Definite Integral as Limit of Sum, Integrals, Multiple Integrals, Quadrature, Rectification, Volume and Surface of Revolution.

Unit V

Differential Equations, Solutions with separation variable, homogenous equation, Linear equation, reducible to variable separable, reducible to homogenous and first order linear differential equation.

Suggested Readings:

1. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company, 9th Revised Edition, 2001
2. Shanti Narayan, "Integral Calculus", S. Chand & Company
3. Shanti Narayan, "Differential Calculus", S.Chand & Company

IMC-115: Professional Communication

Unit I

Communication: Its Meaning, Business English or English for business? Tips for Clear Writing, Avoiding Substandard, Writing, Punctuation, English Spelling, Ways to Enrich Vocabulary, Grammar and Usages (1) The Articles, (2) Nouns, Pronouns, Verbs, Adjectives, Degree of Comparison, (3) Tenses, (4) Auxiliary Verbs (Model Auxiliaries), (5) Prepositions and Conjunctions, (6) Active and Passive, (7) Some Common Idioms and Phrases, (8) Some Foreign Words and Phrases, (9) Precis Writing; Elocution; Telephone Etiquettes, Translation, Comprehension and Essay Writing.

Unit II

(1) How to be a Leader? (2) Presentation Skills (3) Mannerisms & Etiquettes (4) Art of Living (5) Dressing Sense.

Unit III

Fundamentals of Human Relations: Intra-personal, Inter-personal and Group Relationships, Transactional Analysis Implications for Managers in Organizational Context. Formal Written Communication: Official Letters, Report, Writing: Categories Formats, Memorandums and Circulars, Agenda and Minutes, Resume, Drafting Advertisements. Enquires and Replies, Quotations, Voluntary Offers, Placing of Order, Cancellation of Order, Complains and Adjustments. Formal Verbal Communication: Group Discussion, Interview, Extempore, Business Negotiation, Public Speaking, Meeting, Toasting, Counseling, Business Presentation. Negotional Skills. Social Skills for Managers: Update of Etiquettes a Manager should observe in Various Formal and Informal Situations; The Knowledge of Body Language.

Suggested Readings:

1. V.N. Arora and Laxmi Chandra, "Improve Your Writing ed", Oxford Univ. Press, New Delhi.
2. Meenakshi Raman & Sangeeta Sharma, "Technical Communication - Principles and Practices", Oxford Univ. Press 2007, New Delhi.
3. Barun K. Mitra, "Effective Technical Communication", Oxford Univ. Press, 2006, New Delhi.
4. Prof. R.C. Sharma & Krishna Mohan, "Business Correspondence and Report Writing", Tata McGraw Hill & Co. Ltd., New Delhi.
5. M.Rosen Blum, "How to Build Better Vocabulary", Bloomsbury Pub. London.
6. Norman Lewis, "Word Power Made Easy", W.R.Goyal Pub. & Distributors; Delhi.
7. Krishna Mohan, Meera Banerji, "Developing Communication Skills", Macmillan India Ltd. Delhi.

IMC-P111: 'C' Programming Lab

1. Implementation of Simple C program
2. Implementation of Conditional Statement.
3. Implementation of loop
4. Implementation of Switch Statement
5. Implementation of Arrays
6. Implementation of Strings
7. Implementation of Functions
8. Implementation of Pointers.
9. Implementation of Structure

IMC-P112: Digital Electronics Lab

1. Implementation of Gates.
2. State & Prove De Morgan's Law.
3. Verification of Expressions using Gates.
4. Verification of various gates (NOT, OR, AND, Ex-OR, Ex-NOR) using universal gates. (NAND & NOR).
5. Proving of Characteristic table of different Flip Flops.
6. Prove the Conversion Logic of various Flip Flops.
7. Design & Prove the State Table and State Diagram of various flip flop input functions.
8. Design of sequential Circuit using different Flip Flops.
9. Design of various counters using various Flip Flops.
10. Design the sequential circuit using a 2-bit register and combinational gates.
11. Construct the Johnson counter.

II Semester

IMC-121: Data Structure Using 'C'

Unit I

Basic Idea about of Data Structure: Introduction to Data Structure, Classification of Data Structure, Operations on Data Structure, Dynamic Memory Allocation, Types of Case Analysis. **Arrays:** Array Address Calculation, Application of Arrays, Limitation of Array, Array as Function Parameters, Sparse Matrix.

Unit II

Stacks: Introduction, Representation of Stack, Implementation of Stack, Application of stack: Infix, Prefix, Postfix expressions, Conversion of Infix to Prefix and Postfix Expressions, Evaluation of Postfix expression using Stack. **Recursion:** Recursive Definition and Processes, Recursion in C, Example of Recursion, Recursion Vs. Iteration. **Queues:** Introduction, Representation of Queue, Implementation of Queues, Circular Queue, Dequeue, and Priority Queue.

Unit III

Linked Lists: Linear List Concept, Linked List v/s Array, Linked List Terminology, Linked List Data Structure, Representation of Linked List in Memory, Types of Linked List: Simple Linked List, Circular Linked list, Doubly Linked List, Circular Doubly Linked List, Operations on Linked List: Creation, Traversing, Searching, Insert Node (Empty List, Beginning, Middle, End), Delete Node (First, General Case) Count, Sort List.

Unit IV

Introduction to Trees: Tree: Tree Terminology, Binary Tree, Types of Binary Tree, Representation of Binary Tree, Binary Tree Traversal (Inorder, Preorder, Postorder), Binary Tree Creation, Expression Tree, Binary Search Tree, Insertion and Deletion in BST, Graph Terminology.

Unit V

Sorting & Searching Techniques: Bubble Sort, Selection Sort, Insertion Sort, Shell Sort, Quick Sort, Merge Sorts, Binary search and Sequential Search.

Suggested Readings:

1. Balagurusamy, "C & Data Structure"
2. Y.P. Kanetkar, "Data Structure through C"
3. Y. Langsam, M. Augenstein and A. Tannenbaum, "Data Structures using C and C++", Pearson Education Asia, 2nd edition, 2002.
4. Shrivastava & Shrivastava, "Data Structure through C in depth"
5. Seymour Lipsuz, "Data Structure"
6. Tannebaum, "Data Structure"

IMC-122: Operating System

Unit I

Introduction: Definitions, functions and types of operating system, System components, Operating system Structure, System Calls, System Programs, Interrupts, Microkernel

Unit II

Process Management: Process Concepts, Process states & Process Control Block, Process Scheduling: Scheduling Criteria, Scheduling Algorithms (Preemptive & Non-Preemptive) -FCFS, SJF, RR, Priority, Multiple-Processor, Real-Time, Multilevel Feedback Queue Scheduling.

Unit III

Process Synchronization: Critical Section Problem, Semaphores, Classical Problems of Synchronization and their Solutions, Deadlock Characterizations, Method for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

Unit IV

Memory Management: Introduction, Address Binding, Logical versus Physical Address Space, Swapping, Contiguous & Non-Contiguous Allocation, Fragmentation (Internal & External), Compaction, Paging, Segmentation, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms

Unit V

File & Disk Management: Concept of File System(File Attributes, Operations, Types), Functions of File System, Types of File System, Access Methods (Sequential, Direct & other methods), Directory Structure (Single-Level, Two-Level, Tree-Structured, Acyclic-Graph, General Graph), Allocation Methods (Contiguous, Linked, Indexed)

Disk Management: Disk Scheduling Algorithms (FCFS, SSTF, SCAN, C-SCAN, LOOK), Swap Space Management, Disk Reliability, Recovery, Security: Security Threats, Protection, Trusted Systems, Windows Security.

Suggested Readings:

1. Abraham Silberschatz and Peter Baer Galvin, "Operating System Concepts", Fifth Edition, Addison-Wesley.
2. Andrew Tanenbaum, "Modern Operating Systems", Prentice Hall.
3. Harvey M. Deitel, "An introduction to Operating Systems", Addison-Wesley.
4. Milan Milankovic, "Operating Systems, Concepts and Design", TMH
5. William Stallings, "Operating Systems: Internal and Design Principles", 3rd Edition, PHI.
6. Gary Nutt, "Operating Systems, A modern Approach", Third Edition, Addison Wesley, 2004
7. D.M. Dhamdhare, "Operating Systems: A Concept Based Approach". Second Edition, Tata McGraw-Hill, 2007.

IMC-123: System Analysis & Design

Unit I

The System Concept: Definition, Characteristics of Systems, Elements of a System, Open and Closed System, Formal and Informal Information Systems, Computer based Information Systems, Decision Support System, General Business, Knowledge, Management Information System, and Interpersonal Communicational System, Physical or Abstract Systems.

Unit II

Systems Analysis and Design Life Cycle: SDLC, Requirements specifications, Feasibility analysis, Final Specifications , Hardware and Software study, Role of Systems Analyst, Attributes of a Systems Analyst, The War Effort, What Does it take to do System Analysis, The Analyst/User Interface, Behavioral issues.

Unit III

Systems Analysis: System Planning and Initial Investigation, Information gathering tools, The art of Interviewing, Arranging the Interview, Tools used in System Analysis Information: Data flow diagrams, case study for use of DFD, good conventions, Leveling of DFDs, Logical and physical DFDs, The Structured and Unstructured DFDs, Types of Interviews and Questionnaires, , Data Dictionary, Decision Trees and Structured English, , Feasibility Study, Cost/Benefit Analysis.

Unit IV

Systems Design: Logical & Physical Design, Design methodologies, Structured Design, Input/output and Forms Design: Input Design, Output Design, Requirements of form Design, Screen design, graphical user interfaces, interactive I/O on terminals, Specification oriented design vs. Procedure oriented Design.

Unit V

System Implementation: System Testing and validation, Systems Quality Assurance, Level of Quality Assurance, Relationship between Design and Implementation: Implementation issues and programming support environment; Coding the procedural design, System Maintenance, Maintenance activities and issues.

Suggested Readings:

1. Elias M.Awad, "System Analysis and Design"
2. Perry Edwards, "System Analysis and Design"
3. I.T. Haryszkiewicz, "Introduction of System Analysis and Design" , (PHI) 1998

IMC-124: Mathematics II

Unit I

Set Theory : Definition of Sets, Set Representation, Type of Sets, Cardinality of Set, Venn Diagrams, Operation on Sets, Disjoint Sets, Subsets, Power Set, Cartesian Product, Properties of Sets, Proving Set Identities, Duality, Countable and Uncountable Sets, Principle of Inclusion and Exclusion, Multisets.

Unit II

Relation: Introduction, Binary Relations, Properties of Binary Relations, Representation of Relations, Inverse Relation , Domain and Range of Relation, Composition of Relations, Properties of Relations, Closure of Relations, Equivalence Relations, Partitions,.

Unit III

Function: Introduction, Definition, Arrow Diagram, Properties of Functions, Type of Functions, One-to-One Function, Onto Function, Technique to Prove a Function as Onto, One-to-One Correspondence, Inverse Function, Compositions of Functions, Recursively defined Functions.

Unit IV

Posets, Hasse Diagram and Lattices: Introduction, Ordered Set, Partial order relations, Well Ordered Set, Hasse Diagram of Poset, Minimal and Maximal element in a poset, Least and Greatest element, Upper and Least Bounds , Properties of Lattices, Types of Lattices.

Unit V

Groups and Rings: Binary Operation, Type of Binary Operations, Algebraic Systems, Properties, Types i.e. Semi group, Monoid, Groups, Abelian Group, Properties of Groups, Subgroups, Permutation Group, Factor Group, Cyclic Groups, Cosets, Normal Subgroup, Homomorphism and Isomorphism of Groups, Ring, Types of Rings and Properties.

Suggested Readings:

1. J. P. Tremblay and R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", TMH, New Delhi, 2000.
2. Kolman, Busby and Ross "Discrete Mathematical Structures" PHI/Pearson., 6th Ed., 2009.
3. Kenneth H. Rosen, "Discrete Mathematics & Applications", TMH, 6th Ed., 2007.
4. C. L. Liu, "Elements of Discrete Mathematics", McGraw Hill Book Company, 2nd Ed., 1985.

IMC-125: Computer Organization & Architecture

Unit I

Register Transfer and Micro-operation: Register Transfer Language, Register Transfer, Bus and Memory Transfer, Micro operations Arithmetic, Logical, Shift, Micro- operations, Arithmetic logic shift, Timing and control, instruction codes, computer instructions, input & interrupts, machine language instructions.

Unit II

Basic Computer Organizations and Design: Instruction Cycle, Memory Reference Instructions, Register Reference Instructions, Input-Output Instructions, Design of Accumulator Logic Shift Unit. **Central Processing Unit:** General register organization, stack organization, addressing modes, RISC vs. CISC, Hard wired & micro programmed control Unit, data path design, bus organization, scratch pad memory

Unit III

I/O organizations: introduction to system buses, Peripheral Devices, Input/ output interface, Interrupt, S/w Interrupt, Hardware Interrupt, Priority Interrupt, Serial Vs Parallel communications, Synchronous Data Transfer and Asynchronous Data Transfer, modes of Data transfer, (Strobe Control, hand shaking) Programmed I/O, Interrupt initiated I/O, DMA. DMA Controller, DMA Transfer.

Unit IV

Memory Organization: Introduction, fixed and variable length memory, memory hierarchy, Associate memory, cache memory, locality of reference, hit/miss ratio, various mapping process: Associative mapping, direct mapping, and Set-Associative mapping.

Unit V

Basic Concept of 8- bit (8085) ip and 16 Bit (8086) ip introduction to parallel processing comparison with register sets, Architectural Classification Schemes, Vector Processing, Array processing, Instructions Vs arithmetic pipelining. Assembly language Programming based on Intel 8085: Instructions: Data Transfer, Arithmetic Logic, Branch Operations, Conditional call and Return Instructions, Subroutine.

Suggested Readings:

1. Mano Morris, "Digital Logic & Computer Design", PHI
2. Mano Morris, "Computer System Architecture", PHI
3. B.Ram, "Computer Fundamental Architecture & Organization", NewAge
4. William Stalling, "Computer Organization & Architecture", Pearson Education Asia.
5. V.Carl Hamacher, "Computer Organization", TMH
6. Tannenbaum, "Structured Computer Organization", PHI
7. R.S.Goankar, "Microprocessor architecture, Programming and application with 8085", Pen Ram International

IMC-P121: Data Structure Using 'C' Lab

1. Implementation of Arrays (Single & Double Dimension).
2. Implementation of String.
3. Implementation of Recursive Procedures.
4. Array implementation of Stack, Queue, Circular Queue, Linked List.
5. Implementation of Stack, Queue, Circular Queue, Linked List using dynamic memory allocation.
6. Implementation of Binary tree.
7. Implementation of Tree Traversals (preorder, inorder, postorder).
8. Implementation of Searching techniques: Linear Search, Binary Search.
9. Implementation of Sorting techniques: Bubble sort, Merge sort, Insertion sort, Selection sort, and Quick sort.

IMC-P122: Computer Organization Lab

1. Implementation of Program in 8085/8086 for address transfer.
2. Implementation of Program in 8085/8086 for Data Transfer Micro-operation.
3. Implementation of Program in 8085/8086 for r's and (r-1)'s Complement of signed and unsigned numbers.
4. Implementation of Simple Program in 8085/8086 for Arithmetic Micro-operation.
5. Implementation of Program in 8085/8086 for Shift Micro-operation.
6. Implementation of Simple Program in 8085/8086 for Branching Statements.
7. Implementation of Simple Program in 8085/8086 for C

III Semester

IMC-231: Computer Based Numerical and Statistical Techniques

Unit I

Errors and Floating Point Numbers: Errors in numerical computation, Representation of Floating point numbers, Arithmetic operations on floating Point numbers, Normalization, Pitfalls of floating Point representation. **Statistics:** Introduction, Review of Basic Statistics, Different Frequency Chart Histogram, Frequency Curve, Pi-Chart etc., Measurement of Central Tendency.

Unit II

Solution of Non Linear equations: Iterative Methods: Zero of Single transcendental equations and zero's of polynomial using Bisection Method, Iteration Method, Regula-falsi Method, Newton Rapsion Method and Secant Method, Rate of Convergence of iterative Methods. **Solutions of Simultaneous Linear equations:** Solution of System of Linear equation Direct Method and pivoting, Gauss Elimination, Gauss Jordan, Matrix invasion ILL Conditioned system of equations , Refinement of solution , Gauss Jacobi and Gauss Seidel iterative method, Rate of Convergence of iterative method.

Unit III

Interpolation and Approximations: Finite Difference, Difference Tables, Polynomial Interpolation for equal interval: Newton's Forward and Backward, Central Difference formulas: Gauss Forward, Gauss Backward, Stirling's, Bessel's Formula. **Interpolation with Unequal Interval:** Lagrange's Interpolation, Newton divided difference formula. Hermite interpolation, Approximation of function by Taylor's series and Chebyshev Polynomials.

Unit IV

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, of Polynomial Interpolation Newton's Formulae, Central Difference Formulae, Numerical Integration, Trapezoidal Rule, Simpson's Rule, Boole's Rule, Waddle's Rule and Euler-Maclaurin Formula. **Solution of Ordinary Differential Equation:** Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta Method, Predictor Corrector Method, error Monitoring in Ordinary differential Equations Stability of Solution.

Unit V

Curve Fitting: Method of Least Squares, fitting of Straight lines, Polynomials, exponential Curves, Cubic spline and approximations. **Correlation and Regression Analysis:** Correlation, Linear and Non linear Regression, Multiple Regression. **Time Series and Forecasting:** Introduction, Moving Averages Forecasting, Models and Methods, Statistical Quality Control Methods.

Suggested Readings:

1. Shastri S.S., "Numerical Analysis", PHI.
2. Agore R., "Numerical Analysis",.
3. Balaguruswami E, "Numerical Methods", TMH Publications.
4. Gupta S.P., "Statistical Methods", Sultan and Sons.
5. Vishwanath , "Engineering Mathematics II",.
6. Rajaraman V., "Computer Oriented Numerical Methods", PHI.
7. Francis Scheld, "Numerical Analysis", TMH.
8. Kandasamy P. "Numerical Methods", S. Chand Publications.
9. Curtis F. Gerald and Patrick O. Wheatley "Applied Numerical Analysis", Prentice Hall, 1984.
10. D. Kincaid and W. Cheney "Numerical Analysis", Thomson/Brooks-Cole, 2002.

IMC-232: Data Base Management Systems

Unit- I

Introduction: An overview of Data Base Management System, Data Base System Vs File System, Characteristics of the Data Base Approach , Users of DBMS, Advantages and Disadvantages of DBMS. Data Base System Concepts and Architecture: Data Models, Schemas and Instances, DBMS Architecture and Data Independence, Data Base Languages and Interfaces, the Data Base System Environment, Classification of Data Base Management Systems.

Unit- II

Data Modeling using the Entity Relationship Model: ER Model Concepts, Notation for ER Diagram, Mapping constraints, keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, Aggregation, Reduction of an ER Diagrams to Tables, Extended ER Model, Relationships of Higher Degree. Relational Data Model and Language: Relational Data Model Concepts, Integrity Constraints: Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra, Relational Calculus, Tuple and Domain Calculus.

Unit- III

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL Data Types and Literals, Types of SQL Commands, SQL Operators and their Procedure, Tables, Views and Indexes, Queries and Sub Queries, Aggregate Functions, Insert, Update and Delete Operations, Joins, Unions, Intersection, Minus, Cursors in SQL. PL/SQL, Triggers and Clusters.

Unit- IV

Data Base Design & Normalization: Functional Dependencies, Normal Forms, First, Second, Third Normal Forms, BCNF, Inclusion Dependencies, Loss Less Join Decompositions, Normalization using FD, MVD, and JDs, Alternative Approaches to Data Base Design.

Unit- V

Transaction Processing Concepts: Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, Deadlock Handling. Concurrency Control Techniques: Concurrency Control, Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Recovery with Concurrent Transaction.

Suggested Readings:

- 1 Date C J, "An Introduction to Data Base System", Addison Wesley.
- 2 Korth, Silbertz, Sudarshan, "Data Base Concepts", McGraw-Hill.
- 3 Elmasri, Navathe, "Fundamentals Of Data Base Systems", Addison Wesley.
- 4 Paul Beynon Davies, "Data Base Systems", Palgrave Macmillan.
- 5 Bipin C. Desai, "An introduction to Data Base Systems", Galgotia Publication.
- 6 Majumdar & Bhattacharya, "Data Base Management System", TMH.
- 7 Ramakrishnan, Gehrke, "Data Base Management System", McGraw-Hill.

IMC-233: Object Oriented Programming using C++

Unit I

Introduction Procedural Vs Object Oriented Programming, Classes, Object, Data, Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing, Object Oriented Languages, Object Based languages. **Basics of C++:** A Brief History of C & C++, A Simple C++ Program, Application of C++, Structure & Class, Compiling & Linking, Tokens, Keywords, Identifiers & Constants, Basic Data Types, User-Defined Data Types, Symbolic Constant, Type Compatibility, Reference Variables, Operator in C++, Scope Resolution Operator, Member Dereferencing Operators, Memory Management Operators, Manipulators, Type Cast Operator.

Unit II

Functions In C++: The Main Function, Function Prototyping, Call by Reference Call by Address, Call by Value, Return by Reference, Inline Function, Default Arguments, Const Arguments, Function Overloading, Friend Function, Function with Array. **Classes & Object:** A Sample C++ Program with class, Defining Member Functions, Making an Outside Function Inline, Nesting of Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member, Functions, Arrays of Objects, Object as Function Arguments, Friendly Functions, Returning Objects, Const member functions, Pointer to Members, Local Classes.

Unit III

Constructor & Destructor: Constructor Parameterized Constructor, Multiple Constructor in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructor, Const Object, Destructor. **Inheritance:** Defining Derived Classes, Single Inheritance, Making a Private Member Inheritable, Multilevel Inheritance, Hierarchical Inheritance, Multiple Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructor in Derived Classes, Nesting of Classes.

Unit IV

Operator Overloading & Type Conversion, Polymorphism, Pointers, Pointers with Arrays C++, Streams, C++ Stream Classes, Unformatted I/O Operation, Formatted I/O Operation, Managing Output with Manipulators.

Unit V

Template, Template Classes, Explicit Class, Exception handling, Exception Handling Fundamentals, The try Block, the catch Exception Handler, The throw Statements.

Suggested Readings:

1. Herbert Schildt, "C++ The Complete Reference"
2. Kanetkar, "Let us C++"
3. E. Balagurusamy, "Object Oriented Programming with C++"
4. Stanley Lippman & Lajoi, "C++ Primer"
5. Bjarne Stroustrup, "C++ Programming Language"
6. Al Stevens & Clayton Walnum, "C++ Programming Bible"

IMC-234: Discrete Mathematical Structure with Application to Computer Science

Unit I

Discrete Numeric Function and Recurrence Relation: Numeric Function, Generating Function, Recurrence Relation, Linear Recurrence Relation with Constant Coefficients, Homogeneous and Particular Solution, Total Solution, Solution by Method of Generating Function.

Unit II

Counting Techniques: Basics of Counting, Sum and Product rules, Pigeonholes Principle, Combinations and Permutations.

Unit III

Fundamentals of Logics: Introduction, Proposition, First order Logic, Logical Operation, Truth Values, Compound Proposition, Tautologies, Contradiction, Logical Equivalences, De-Morgan's laws, Duality, Predicates, Universal and Existential Quantifiers.

Unit IV

Graph: Simple Graph, Multi Graph, Graph Terminology, Bipartite, Regular and Planar Graph, Directed Graph, Representation of Graphs, Connected Components in a Graph, Euler Graphs, Hamiltonian Path and Circuits, Graph Coloring, Chromatic Number, Isomorphism and Homomorphism of Graphs, Weighted Graphs, Shortest Path in Weighted Graphs.

Unit V

Tree: Tree, Trivial and Non-Trivial Tree, Properties of Trees, Rooted Tree, Distance and Centers in a Tree, Binary Trees, Path Length in Rooted Tree, Spanning Tree, Minimal Spanning Tree, Kruskal's and Prim's Algorithms.

Suggested Readings:

1. J. P. Tremblay and R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", TMH, New Delhi, 2000.
2. Kolman, Busby and Ross "Discrete Mathematical Structures" PHI/Pearson., 6th Ed., 2009.
3. Kenneth H. Rosen, "Discrete Mathematics & Applications", TMH, 6th Ed., 2007.
4. C. L. Liu, "Elements of Discrete Mathematics", McGraw Hill Book Company, 2nd Ed., 1985.
5. Narsingh Deo, "Graph Theory", PHI, 24th Indian Print, 2003.

IMC-235: Environmental Issues of IT & Green Computing

Unit I

Introduction to Green Computing, ICT and the environment, Applications of Green computing, Impact of IT resources on the global environment, other Environmental issues like Climate change and Global warming, Environmental Kuznets curve, Kyoto Protocol.

Unit II

Concept of sustainability, Sustainable Computing, Eco-engineering technologies, Carbon Footprint, computing carbon footprint of individuals and organizations, techniques to reduce carbon footprint.

Unit III

Energy-Efficient Computing to reduce Power consumption, Virtualization, Telecommuting, Screen Savers, myths and misconceptions of energy saving techniques, Energy efficient computers and its parts, points to think before purchasing computer peripheral devices, Role of IT Vendors facilitating green computing, Design of eco-friendly computers

Unit IV

E-waste, WEEE, Measures for reduction of paper waste and e-waste in Eco-friendly Computing, Computer consumables and recycling of e-waste (Old Computers, Toner Cartridges, Diskettes and CDs)

Unit V

Regulations and industry initiatives-actions taken by different governments to promote green computing, Energy Star program, EPEAT, RoHS directive, SEI

Suggested Readings:

1. Jason Harris, "Green Computing And Green IT Best Practices"
2. Larry Webber, Lawrence Webber, Michael Wallace, "Green Tech"
3. Ron Beres, Lisa Beres, "Just Green IT"
4. Toby Velte, Anthony Velte, Robert C. Elsenpeter, "Green IT"

IMC-P231: Data Base Management Systems Lab

1. Use of DDL for creating objects(Table, Database)
2. Use of DML for performing retrieval operations.
3. Use of DCL for specifying constraints on tables.
4. Use of aggregate functions.
5. Use of String functions.
6. Grouping & Ordering Records
7. Creating Views Performing queries for Join, Union & intersection etc.
8. Creating Indexes.
9. Write Programs in PL/SQL
10. Understanding the concept of Cursors
11. Writing Assertions Triggers.
12. Creating Forms, Reports etc.
13. Writing codes for generating read and update operator in a transaction using different situations.
14. Implement of 2PL concerning central algorithm.

IMC-P232: Object Oriented Programming Using C++ Lab

1. Implementation of Fundamental Data Types & Testing and Debugging of Programs.
2. Implementation of Basic Control Flow.
3. Implementation of type Conversion.
4. Implementation of Functions.
5. Implementation of Advanced Flow of Control.
6. Implementation of Vectors, Arrays and Pointers.
7. Implementation of Classes & Objects.
8. Implementation of Constructors and Destructors.
9. Implementation of Static Data Members and Static Member Functions.
10. Implementation of Function Overloading and Operator Overloading.
11. Implementation of Function Overriding and Operator Overriding.
12. Implementation of Inheritance.
13. Implementation of Polymorphism.
14. Implementation of Exception Handling.
15. Implementation of Templates in C++.
16. Implementation of Friend Function & Friend class.

IV Semester

IMC-241: UNIX & Shell Programming

Prerequisite: Operating Systems

Unit I

Introduction: Introduction to UNIX, UNIX System Organization (the Kernel and the Shell), Files and Directories, Library Functions and System Calls, Editors (vi and ed). Introduction to the Concept of Open Source Software, Linux, Linux Architecture, Linux File System (inode, Super block, Mounting and Unmounting), Essential Linux Commands, Kernel, Process Management in Linux, Signal Handling, System Call, System Call for Files, Processes and Signals.

Unit II

Shell Programming: Types of Shells, Shell Meta Characters, Shell Variables, Shell Scripts, Shell Commands, the Environment, Integer Arithmetic and String Manipulation, Special Command line Characters, Decision Making and Loop Control, Controlling Terminal Input, Trapping Signals, Arrays, I/O Redirection and Piping, Vi and Emacs Editors, Shell Control Statements, Find, Shell Meta-Characters, Shell Scripts, Shell Keywords, Shell Procedures and Reporting, Handling Documents, Changing Process Priority with Nice, Scheduling of Processes at Command, cron, Batch commands.

Unit III

Process Management and Process Synchronization:

Command line argument, Background processes, process synchronization, Sharing of data, user-id, group-id, pipes, fifos, message queues, semaphores, shared variables, Coding, Compiling, Testing and Debugging. AWK programming – report printing with AWK.

Unit IV

System Administration: System administration Common administrative tasks, identifying administrative files – configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disable user's accounts, creating and mounting file system, checking and monitoring system performance file security & permissions, becoming super user using su.

Unit V

Advanced System Administration: Getting system information with name, host name, disk partitions & sizes, users, kernel. Backup and restore files, reconfiguration hardware with kudzu, installing and removing packages in Linux. Configure X-windows starting & using X desktop. KDE & Gnome graphical interfaces, changing X windows settings.

Suggested Readings

1. Sumitabha Das "Unix Concepts and Applications", TMH.
2. Yashwant Kanetkar "Unix Shell Programming", BPB.
3. Parata "Advanced Unix-A Programmer's Guide", BPB.
4. Meeta Gandhi, "The C Odyssey Unix- The Open Boundless C", BPB.

IMC-242: Design & Analysis of Algorithms

Unit I

Basic Concepts of Algorithms: Definitions, Explanation & Scope, Model of Computation: RAM, TM etc., Time and Space Complexity, Asymptotic Notations (Growth of Functions), Pseudo Codes & Time Complexity of Basic Control Structures, Time Complexity of: Insertion Sort, Heap Sort, Merge Sort, Quick Sort, Recurrences, Sorting in Linear Time.

Unit II

Analysis of Data Structures: Elementary Data Structure, Dictionaries & Hash Tables, Binary Search Tree, Red Black tree, B-Trees, Binomial Heaps, Fibonacci Heaps, Data Structures for Disjoint Sets, Augmenting Data Structures, AVL Tree, Splay Tree.

Unit III

Advanced Design & Analysis Techniques: Dynamic Programming: Assembly Line Scheduling, Matrix Chain Multiplications, Longest Common Subsequence, Optimal Binary Search Tree, Activity Selection Problem, Dynamic Programming Solution to the 0/1 Knapsack Problem, Optimal Polygon Triangulation. **Greedy Algorithms:** Knapsack Problem, Huffman Codes, An Activity Selection Problem, Task Scheduling Problem **Back Tracking:** Recursive Maze Algorithm, Hamiltonian Circuit Problem, Subset-Sum Problem, N-Queens Problem, **Branch & Bound:** FIFO Branch-and-Bound Algorithm, Least Cost Search, Knapsack Problem, Assignment Problem, Traveling Salesman Problem, n puzzle, Amortized Analysis.

Unit IV

Analysis of Graph Algorithms: Elementary Graph Algorithms: BFS & DFS, Minimum Spanning Trees: Kruskal & Prim, Single Source Shortest Path: The Bellman-Ford Algorithm, Dijkstra's Algorithm, All Pairs Shortest Path: The Floyd Warshall Algorithm, Johnson's Algorithm Maximum Flow: Ford-Fulkerson Method.

Unit V

Selected Topics: NP Completeness: Polynomial Time, Polynomial Time Verification, NP- completeness and reducibility, NP- completeness proofs, NP- complete problems, String Matching, Approximation Algorithms, Computational Geometry, Sorting Networks, Randomized Algorithms.

Suggested Readings:

1. Thomas H. Cormen, "Introduction to Algorithms", PHI.
2. Horowitz & Sahani, "Fundamental of Algorithms", Galgotia.
3. Donald E. Knuth, "The Art of Computer Programming", Vol. I, II, III, Pearson.
4. Aho, "Design & Analysis of Computer Algorithms", Pearson.
5. Johnsonbaugh, "Algorithms", Pearson.
6. Bressard "Fundamental of Algorithm", PHI.
7. Jon Kleinberg and Eva Tardos "Algorithm Design", Pearson Education, 2006.
8. Anany Levitin "Introduction to the Design and Analysis of Algorithm", Pearson Education, 2003.
9. Sara Baase and Allen Van Gelder "Computer Algorithms - Introduction to Design and Analysis", Pearson Education, 2003.
10. Steven S. Skiena "Algorithm Design Manual", Springer, 1998.

IMC-243: E-Governance

Unit I

Introduction: E-Governance: Needs of E-Governance, Issues in E-Governance applications and the Digital Divide; Evolution of E-Governance, Its scope and content; Present global trends of growth in E-Governance; Other issues.

Unit II

Models of E-Governance: Introduction; Model of Digital Governance: Broadcasting/ Wilder Dissemination Model, Critical Flow Model, Comparative Analysis Model, Mobilization and Lobbying Model, Interactive-service Model/Government-to-Citizen-to-Government Model (G2C2G); Evolution in E-Governance and Maturity Models: Five Maturity Levels, Characteristics of Maturity Levels, Key areas, Towards Good Governance through E-Governance Models.

Unit III

E-Governance Infrastructure and Strategies: E-readiness: Digital System Infrastructure, Legal Infrastructural Preparedness, Institutional Infrastructural Preparedness, Human Infrastructural Preparedness, Technological Infrastructural Preparedness; Evolutionary Stages in E-Governance.

Unit IV

Data Warehousing and Data Mining in Government: Introduction; National Data Warehouses: Census Data, Prices of Essential Commodities; Other areas for Data Warehousing and Data Mining: Agriculture, Rural Development, Health, Planning, Education, Commerce and Trade, Other Sectors.

Unit V

Case Studies: Indian Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andhra Pradesh, Ekal Seva Kendra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchayat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.

Suggested Readings:

1. C.S.R. Prabhu, "E-Governance: Concepts and Case Studies", Prentice-Hall of India Private Limited, 2004.
2. Backus, Michiel, "e-Governance in Developing Countries", IICD Research Brief, No. 1, March 2001.
3. N. Gopalsamy, "Information Technology & e-Governance", New Age Publication, First Edition 2009.

IMC-244: Probability & Statistical Inference

Unit I

Probability and Expected Value: Experiment, Sample Space, Event, Types of Event, Probability, Classical Approach, Subjective Approach, Axiomatic Approach & Modern Definition; Probability Theorems (Additive, Multiplicative), Conditional Probability, Bayes's Theorem, Mathematical Expectation, Random Variable & Probability Distribution of Random Variable.

Unit II

Theoretical Distributions: Meaning of Theoretical Distributions, Difference between Theoretical & Observed Frequency Distributions, Binomial Distribution, Properties and Constants of Binomial Distribution; Poisson Distribution, Characteristics, Properties and Constants of Poisson Distribution, Poisson Distribution as an Approximation of Binomial Distribution; Normal Distribution, Properties and Constants of Normal Distribution, Relation between Binomial, Poisson & Normal Distribution.

Unit III

Statistical Inference: Concept of Statistical Hypothesis, Types of hypothesis, Procedure of testing the hypothesis, Types of Error, Level of Significance, Degree of freedom. Chi-Square Test, Properties and Constants of Chi-Square Distribution. Student's t-Distribution, Properties & Applications of t-Distribution, Analysis of Variance, F-Test, Properties & Applications of F-Test.

Unit IV

Non-Parametric Test: Introduction and Advantages of NP Test, Sign Test, Rank-Sum Test: Mann-Whitney Test, One Sample Run Test, Kruskal-Wallis (H-Test). Statistical Decision Theory: Introduction, Ingredients of Decision Problem, Components of a Problem, Optimal Decisions, Pay-off Table, Expected Monetary Value, Decision making with Uncertainty, Expected Value of Perfect Information (EVFI), Decision Tree Analysis.

Unit V

Statistical Quality Control: Introduction, Types of Control Charts, X-Bar Chart, R Chart, C-Chart, Advantages and Limitations of SQC. Markov Analysis: Introduction, Markov Process, Transition Probability, Transition Probability Matrix, First order and Higher Order Markov Process, Markov Chain, Steady-State (Equilibrium) Conditions.

Suggested Readings:

1. Alberto Leon-Garcia, "Probability and Random Processes for Electrical Engineering", Second Edition
2. Roy D. Yates and David J. Goodman, "Probability and Stochastic Processes-A friendly introduction for Electrical & Computer Engineers, Second Edition
3. Rohatgi V, "An Introduction to probability and Mathematical Statistics" Wiley Eastern Ltd. New Delhi
4. Johnson, S. and Kotz, "Distributions in Statistics", Vol. I, II and III, Houghton and Mifflin
5. Adke, S.R. and Munjunath, S.M., "An Introduction to Finite Markov Processes", Wiley Eastern

IMC-245: IT Act & Cyber Laws

Unit I

History of Information Systems and its Importance, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damages, Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, Authentication Service Security, Security Implication for organizations, Laptops Security Framework for Information Security, ISO 27001, SEE-CMM, Security Metrics, Information Security Vs Privacy.

Unit II

Basic Principles of Information Security, Confidentiality, Integrity, Availability and other terms in Information Security, Information Classification and their Roles, Security Threats to E-Commerce, Virtual Organization, Business Transactions on Web, E-Governance and EDI, Concepts in Electronics payment systems, E-Cash, Credit/Debit Cards.

Unit III

Physical Security- Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls, Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges.

Unit IV

Model of Cryptographic Systems, Issues in Documents Security, Science of Cryptography: Public Key Cryptography, Hashing techniques- MD5, SHA-1, SHA-2; Digital Signature, Fingerprints, Firewalls, Design and Implementation Issues, Policies; Network Security - Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection; Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN.

Unit V

Cyber Crime and Cyber Laws, Types of Cyber Crimes, Cyber Law Issues in E-Business Management, Overview of Indian IT Act, Information Technology Act 2000, International Scenario in Cyber Laws: Data Protection Laws in EU and USA, Ethical Issues in Intellectual property rights, Copy Right, Patents, Data privacy and protection, Domain Name, Software piracy, Plagiarism, Issues in ethical hacking.

Suggested Readings:

1. Godbole, "Information Systems Security", Willey
2. Merkov, Breithaupt, "Information Security", Pearson Education
3. Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill
4. Sood, "Cyber Laws Simplified", Mc-Graw Hill
5. Furnell, "Computer Insecurity", Springer
6. Indian IT Act 2000-Bare Act Professional.
7. Pavan Duggal, "Cyberlaw-The Indian Perspective: 2009 Edition with IT Act amendments 2008", Saakshar Law Publications.
8. Farooq Ahmad, "Cyber law in India", Pioneer Books.
9. Vakul Sharma, "Information Technology Law and Practice", Universal Law Publishing Co. Pvt. Ltd..
10. Suresh T Vishwanathan Bharat, "The Indian Cyber Law", Law house New Delhi.
11. P.M. Bakshi & R. K. Suri, "Hand Book of Cyber & E-Commerce Law", Bharat Law House New Delhi.

IMC-P241: UNIX & Shell Programming Lab

1. To Study basic UNIX/ Linux Commands.
2. Understanding filters & pipes to perform complex tasks-pr, head, tail, cut, paste, sort, uniq, nl, tr, grep etc.
3. Learning vi editor
4. Writing Shell script for Unix environment
5. Shell programming- writing simple functions, basic tests, loops, patterns, expansions, substitutions
Linux/Unix Processes and Process Control-fork, exec, getpid, wait, sleep etc.
6. Implementing Process Synchronization methods-fifos, semaphores, message queues
7. Using Regular Expressions (including basic awk programming)
8. Writing, compiling and running a C program on Unix / Linux.
9. Study the basic System Administration commands-user authorization, grant of users rights and privileges, backup and recovery
10. Practice sessions on X-windows, KDE and Gnome

IMC-P242: Design and Analysis of Algorithms Lab

1. Creation of Binary Search Tree and Insertion & Deletion into it.
2. Creation of a Red Black tree and all the associated operations on it.
3. Implementation of AVL trees all the associated operations on it.
4. Multiplication of two matrices using Strassen's Matrix Multiplication method.
5. Solving Knapsack problem.
6. Implementing shortest path algorithms (Dijkstra's & Bellman Ford Algorithm)
7. Finding the minimum cost spanning tree in a connected graph.
8. Finding the number of connected components in a graph.

V Semester

IMC-351: Object Oriented Modeling and Designing

Unit I

Introduction to UML and Structural Modeling-Conceptual model of UML, Software development lifecycle, basic structural Modeling- the vocabulary of the system, modeling the distribution of responsibilities in a system, modeling non software things, modeling primitive types, relationships-modeling simple dependencies, single inheritance, structural relationships, common mechanisms-modeling comments, new properties, new semantics, diagrams-modeling different views of a system, different levels of abstraction, class diagrams-modeling simple collaborations, logical database schema.

Unit II

Behavioral Modeling: Interactions-modeling a flow of control, use cases-modeling the behavior of an element, use case diagrams-modeling the context of system, modeling the requirements of a system, interaction diagrams-modeling flows of control by time ordering, by organization, activity diagrams-modeling a workflow, modeling an operation.

Unit III

Architectural Modeling I: Components-modeling executables and libraries, tables, file, documents, API, source code, deployment-modeling processors and devices, modeling the distribution of components, collaborations-modeling the realization of a use case, of an operation.

Unit IV

Architectural Modeling-II: Patterns and framework-modeling design patterns, modeling architectural patterns, component diagrams-modeling source code, executable release, physical database, adaptable systems, deployment diagrams-modeling an embedded systems, client/server system, fully distributed system, systems and models-modeling the architecture of a system, modeling systems of systems.

Unit V

Introducing the concept of rational rose, building class ,object, state diagrams using rational rose, basic behavioral modeling-interactions ,use cases, use case diagrams, interaction diagrams, activity diagrams.

Suggested Readings:

1. Grady Booch, James Rumbaugh , Ivar Jacobson, "The Unified Modeling Language user guide " Pearson Education India, 2003
2. James Rumbaugh et al, "Object Oriented Modeling and Design", PHI
3. Wendy Boggs, Michael Boggs, "Mastering UML with rational rose", BPB Publications,2002
4. Craig Larman, "Applying UML and Patterns", 2nd Edition, Pearson, 2002.

IMC-352: Management Information System

Unit I

Management Information Systems – Need, Purpose and Objectives – Contemporary Approaches to MIS, Information as a strategic resource – Use of information for competitive advantage – MIS as an instrument for the organizational change, Information, Management and Decision Making – Models of Decision Making – Classical, Administrative and Herbert Simon’s Models – Attributes of information and its relevance to Decision Making – Types of information.

Unit II

Information Technology – Definition, IT Capabilities and their organizational impact – Telecommunication and Networks – Types and Topologies of Networks – IT enabled services such as Call Centers, Geographical Information Systems etc., Data Base Management Systems – Data Warehousing and Data Mining.

Unit III

Decision Support Systems – Group Decision Support Systems – Executive Information Systems – Executive Support Systems – Expert Systems and Knowledge Based Expert Systems – Artificial Intelligence.

Unit IV

Management Issues in MIS – Information Security and Control – Quality Assurance – Ethical and Social Dimensions – Intellectual Property Rights as related to IT Services / IT Products – Managing Global Information Systems.

Unit V

Applications of MIS in functional areas as well as in the service sector, Supply chain Management, Customer Relationship Management, Procurement Management, Enterprise resource planning should, Case studies.

Suggested Readings:-

1. Laudon and Laudon, “Management Information Systems”, Pearson Education Asia.
2. Jawadekar, “Management Information Systems”, Tata McGraw-Hill.
3. Davis and Olson, “Management Information Systems”, Tata McGraw-Hill.
4. Turban and Aronson, “Decision Support Systems and Intelligent Systems”, Pearson Education Asia.
5. O’Brien, “Management Information Systems”, 8/e, Tata McGraw-Hill.
6. Kroenk Hatch,, “Management Information Systems”, Tata McGraw-Hill.
7. Jayant Oke, “Management Information Systems”.
8. Ron Weber, “Information System Control and Audit”.

IMC-353: Electronic and Mobile Commerce

Unit I

Introduction to Electronic Commerce: E-commerce Vs. Traditional Commerce, Electronic Commerce Framework, The Anatomy of E-Commerce Applications, Electronic Commerce Consumer Applications, Electronic Commerce Organization Applications, Advantages and Disadvantages of E-commerce, Impact of Electronic Commerce, Classification of E-commerce, Benefits of E-Commerce, Impediments of E-Commerce, Incentives for engaging in E-commerce, Impact on Business, Limitations of E-commerce.

Electronic Commerce Business Models: Native Content based Model, Translated Content Model, Native Transaction Model, Translated Transaction Models. Electronic Data Interchange: Conventional Trading Process, What is EDI, Benefits of EDI, Applications of EDI, A Case Study: Adoption of EDI in Indian Customs and Excise Department.

Architectural Framework of Electronic Commerce: Network Infrastructure, Information Distribution Technology, Networked Multimedia Content Publishing Technology, Security and Encryption, Payment Services, Business Service Infrastructure, Public Policy and Legal Infrastructure

Unit II

Electronic Commerce Security: Vulnerability of Information on Internet, Sources of Technical Vulnerability, Types of Incidents, Security Policy, Procedures, and Practices, Site Security, Protecting the Network, Firewalls, Types of Firewalls, Limitations of Firewall, Securing the Web Services.

Unit III

Securing Network Transaction in E-Commerce: Security Services, Cryptology, Cryptographic Algorithms; DES, IDEA. Public Key Algorithms; the RSA Algorithm, Message Direct Algorithm, Secured Hash Algorithm. Authentication Protocols; Authentication using a Shared Secret Key, Using a Key Distribution Centre, Using Kerberos, and Using Public Key Cryptography. Digital Signatures; Secret Key Signature, Public Key Signature. Electronic Mail Security; Security Protocols for Web Commerce; SSL, SET, SHTTP, and SHEN.

Unit IV

Electronic Payment System: Introduction, Benefits of using EPS, Limitations of Traditional EPS, Methods and Types of E-Payment, Digital Token Based EPS, Electronic Cash, Electronic Cheques, Credit Card Based EPS, Magnetic Strip Cards, Smart Card, Smart Card Based EPS, Risk involved in EPS. A Case Study: SBI e Rail for Railway Tickets

Unit V

Mobile Commerce: Introduction to the Mobile Universe, Benefits of Mobile Commerce, Impediments in Mobile Commerce, Mobile Commerce Framework, Mobile Information Access Devices, Wireless Network Infrastructure, Information Distribution Protocols, Mobile Device Compatibility Publishing Languages, Security and Encryption, Mobile Commerce Payment Systems, , Mobile Commerce Applications, Location Based Mobile Commerce Services, Group Oriented Mobile Commerce Services, Mobile Auctions, Mobile Entertainment Services, Multi-Party Games, Financial Services, Emerging Issues in Mobile Commerce, Management of Mobile Commerce Services, Personalized Content Management, Implementation Challenges in Mobile Commerce.

Suggested Readings:

1. Bharat Bhaskar, "Electronic Commerce 2/e", Tata McGraw Hill
2. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison-Wesley
3. Bajaj and Nag, "E-Commerce: The Cutting Edge of Business", Tata McGraw Hill
4. P. Loshin, John Vacca, "Electronic Commerce", Firewall Media, New Delhi
5. Debra, Cameron, "Electronic Commerce: The New Business Platform for the Internet", Computer Technology Research Corp.
6. Marilyn, Greenstein, "Electronic Commerce: Security Risk Management and Control"
7. Norman, Sadeh, "M Commerce: Technologies, Services, and Business Models", Wiley Computer Publishing

IMC-354: IT Strategy Management

Unit I

Business Strategy: Introduction to Business Strategy, Business Strategy Challenges and Opportunities in the Global World, IT Strategy; Application Strategy , Technology Strategy for IT, IT Management Strategy, Developing IT Strategy for Competitive Advantage, Stages of IT Strategy Development and Implementation.

Business And IT Alignment: Definition of Alignment, Challenges of IT business Strategy Alignment, Inhibitors of Business and IT Strategy Alignment, Three-D Framework for Business and IT Alignment, Uniqueness About Alignment, Methods for Achieving Business and IT Alignment, Business And IT Alignment Tools

Unit II

Strategic IT Planning: Business Implications for IT Strategy and Planning, Strategy IT Planning Motivation, SIPP Process: Prevalent Planning Approaches, Difficulties in Developing and Executing SIPP, SIPP Approaches: Prevalent Researches, Business Systems Planning Approach, Critical Success factors Approach, Stages of Growth, Value Chain Analysis, e-Business value matrix, Linkage Analysis Planning, Scenario Planning, Integrated Planning Approach, Content of SIPP, The Planning Horizon, Implementation Considerations of SIPP, Change Management Issues of SIPP Development and Implementation, Monitoring and measuring SIPP Success, Information Technology Strategy Committee

Enterprise It Architecture: Introduction, Challenges Addressed By Enterprise IT Architecture, Why Need for EITA Study and Contemporary Research, Advantages of Defining EITA, Contents of A typical Enterprise IT Architecture, Standard for Enterprise IT Architecture

Unit III

Technology Management Strategy For It: Need of Technology Management Strategy for IT, Technology Management Strategy Framework, Technology Management Strategy Motivation, Constituents of Technology Management Strategy for IT, Prevalent Technology Reference Architectures Framework and Standards, The Open Group Architectural Framework (TOGAF).

Strategy For It Program Management: Need for Strategic View for Project, Program and Portfolio Management, Program Management, Difference between Program Management and Project Management, Need for setting up a PMO, Some Quantified Benefits of PMO, Desired Qualities of a Program Office Manager, Maturity of PMO Implementation of PMO Strategy, Staffing of PMO, Measuring PMO Performance, Success Factors for PMO, Maturity Assessment of Project Management Practices, Strategy of Application Portfolio Management, Project Scope Management, Managing Overall Risk.

Unit IV

IT Service Management Strategy: Introduction, Need for having Strategies for IT Service Management, IT Service Management, Information Technology Infrastructure Library(ITIL), ITIL Service Support Processes; Incident Management, Problem management, Change Management, Release Management, Configuration management, Service Delivery; Service Level Management, Financial management, Capacity Management, IT Service Continuity Management (ITSCM), Availability Management, Security Management, Services Life Cycle, Measuring and Realizing IT Service Management Advantages

IT Sourcing Strategy: Outsourcing, Motivation and Need to Outsource, Outsourcing and Associated Risks, Minimizing Risk, Strategic vs. Generic Sourcing, Variants Of Outsourcing, Insourcing, Outsourcing Joint Venture, Contract Management and governance, Managing Outsourcing Transition

Unit V

Planning And Measuring Returns On IT Investment: IT Business Value Framework, Critical Factors for the IT Benefits Realization, Optimum IT Investment, Measuring Benefits from IT, Defining and Measuring Return on Investment,. Communicating and Marketing the Business Benefits.

Strategies For Management IT-LED Change: IT Strategy Implementation, Issues at Business and IT Alignment, Issues with End-users, Issues of IT Professional: In- House as well as Outsourced Service Providers, Barriers of Change, Managing Change, Driving the Change Through Steering Committee, Acquire and Enhance New Skill Set.

Suggested Readings:

1. S.S. Dubey, "IT Strategy and Management", Prentice Hall of India, 2009.
2. Lynda Applegate, Robert Austin, "Corporate Information Strategy and Management: Text and Cases 8th edition." Tata McGraw Hill.

IMC-355: Theory of Computation

Unit I

Introduction to Languages & Finite Automata: Introduction to Defining Language, Kleene Closures, Arithmetic Expressions, Defining Grammar, FA, Transition Graph, Generalized Transition Graph, DFA, NFA, Method of Conversion from NFA to DFA, FA with ϵ -moves, Method of Conversion from NFA with ϵ -moves to NFA, Equivalence of 'NFA with ϵ -moves' to DFA.

Unit II

Regular Expressions & Languages (Regular & Non Regular): Introduction to Regular Expressions, Construction of NFA with ϵ -moves from Regular Expression, Construction of DFA from Regular Expression, Construction of Regular Expression from DFA, FA with o/p: Mealy Automation, Moore Automation, Equivalence of Mealy and Moore Automations: Moore Machine-to-Mealy Machine, Mealy Machine-to-Moore Machine, Pumping Lemma for Regular Languages, Properties of Regular Languages, Decision Problem of Regular Languages.

Unit III

Non Regular Grammars: Chomsky's Hierarchy, Sentential Forms, CFG & CFL, CSG, Derivation Tree, Ambiguous Grammar, Pushdown Automation, CNF, GNF, Pumping Lemma for CFLs, Properties of CFL, Decision Problem of CFL, Undecided Problems of CFL.

Unit IV

Turing Machines: Turing Machine as Acceptor, Computing Devices, Generalized Versions, Restricted Turing Machines, Turing Machines as Enumerators, Equivalence between Turing Machines & Type 0 Languages, Linear Bounded Automata, Gödel Numbering, Universal Turing Machine.

Unit V

Recent Trends & Applications: Regulated Rewriting, Marcus Contextual Grammars, Lindenmayer Systems (L-Systems), Grammar Systems and Distributed Automata, DNA Computing, Membrane Computing.

Suggested Readings:

1. John E. Hopcroft & Jeffery D. Ullman, "Introduction to Automata Theory, Languages & Computation", Pearson.
2. K L P Mishra & N. Chandra Shekhran, "Theory of Computer Science", PHI 2010.
3. Kamala Krithivasan Rama R., "Introduction to Formal Languages, Automata theory & Computation", Pearson 2010.
4. E.V. Krishnamurthi, "Introductory Theory of Computer Science", East West Press.
5. ZVI Kohavi, "Switching & Finite Automata Theory", TMH.

IMC-P351: Object Oriented Modeling & Designing Lab

1. Introduction to rational rose tool
2. Designing class diagrams
3. Using attributes and operations in class diagrams
4. Using generalization, aggregation concepts
5. Using multiplicity symbols
6. Designing relationships
7. Using objects, links, roles, messages, sequencing in interaction diagrams
8. Using actors, flow of events in use cases diagrams
9. Using states, transitions, objects in activity diagrams
10. Using components and classes in component diagram
11. Using connections, simple nodes, extended nodes in deployment diagrams
12. Using names, structure and behavior in collaboration diagram

IMC-P352: Management Information System Lab

1. Identify a Real time Business Domain Problem.
2. Documentations of the Problem (Preparation of Problem statement) by using process Analyst tools for making DFD/ER Diagrams.
3. Search for the solution of the problem
4. Perform Feasibility study of the solution.
5. Laboratory experiment in use of interactive SQL.
6. Designing and implementing fully functional Information System by using any language.
7. Development of an IT based Application for the Business.
8. Report Generation for Managerial Solutions.

VI Semester

IMC-361: Software Engineering

Unit I

Introduction to Software Engineering: Introduction to Software, Types of software, Software Engineering, Software Components, Software Characteristics, Scope and necessity of Software Engineering, Software Engineering Processes, Factors affects Quality and Quantity of Software. Software Development Life Cycle (SDLC), **Software Models:** Water Fall Model, Prototype Model, RAD Model, Evolutionary Development Models (Spiral Model, Incremental Model Concurrent Development Model)

Unit II

Software Requirement Analysis: Requirement Specifications: Need for SRS, Nature of SRS, Characteristics, Components of a SRS. Requirements analysis: Review and Management of User Needs, Feasibility Study, Information Modeling, IEEE Standards for SRS, Various SRS Templates, Validation of SRS.

Software Metrics and Measurement: Software Process and Project Metrics, Software Measurement, Cyclomatic Complexity Measures: Control Flow Graphs, Software Quality Matrices.

Software Project Planning: Objectives, Scope, Software Cost Estimation: Decomposition Techniques: Software sizing , Problem Based Estimation, Line of Code(LOC) Vs Function Point (FP) Based Estimation, Process Based Estimation; Empirical Estimation Models: The COCOMO Model; Make/Buy Decision, Software Risk Management.

Unit III

Software Analysis & Design using both Conventional and Object Oriented approach:

Analysis: Analysis Model, Process and various Documents.

Conventional Analysis: Data Modeling (ER Diagram), Functional Model & Information Flow (DFDs), Behavioral Modeling, Structured Analysis, Data Dictionary.

Object Oriented Analysis: Domain Analysis, Object Oriented approach Process (Use Case), Object-Relational Model, Object- Behavioral Model.

Design:

Conventional Design: Design Process, Principles & Concepts, and Design Model.

Object Oriented Design: Design Issues, Design Process: System Design, Object Design.

Software Design Document: Software Design Document & its various example templates: Data Design, Architecture Design, and Interface Design & Procedural Design.

Coding: Coding, Code Debugging, Coding Verification and Coding Optimization.

Unit IV

Testing, Deployment & Maintenance: Objectives of Testing, Types of Software Testing, Testing for Functionality and Performance, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Levels of Testing: User, Integration, System Alpha and Beta Testing, User Acceptance ; of Products, Roll out of Software & Deployment Issues. What is Maintenance, Need for Maintenance, Categories of Maintenance: Corrective, Preventive, Adaptive and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering, Software Reuse.

Unit V

Introduction to Software Project Management (SPM): Software Configuration Management (SCM), Software Version Control. Software Quality Management, Software Quality Assurance (SQA), Software Reliability & Reliability Models, Clean Room Software Engineering Approach.

CASE Tools: Overview of CASE Tools Framework, Features, Advantages and Limitations of CASE Tools, Awareness about Some Commercial CASE Tools Use and Applications.

Suggested Readings:

1. R. S. Pressman, "Software Engineering: A Practitioners Approach", McGraw Hill.
2. Rajib Mall, "Fundamentals of Software Engineering", PHI Publication.

3. Pankaj Jalote, "Software Engineering", Wiley.
4. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, "Fundamentals of Software Engineering", PHI Publication.
5. Ian Sommerville, "Software Engineering", Addison Wesley.
6. Kassem Saleh, "Software Engineering", Cengage Learning.
7. Pfleeger, "Software Engineering", Macmillan Publication.
8. Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
9. James Peter, W. Pedrycz, "Software Engineering" John Wiley & Sons.
10. Michael Dyer, "The Cleanroom approach to Quality Software Engineering", John Wiley & Sons, 1992.

IMC-362: Computer Graphics

Unit I

Overview of Graphics Systems & Graphics Primitives: Definition, Classifications, Characteristics, Components of CG, Applications of CG, Graphic Hardware: Display Devices: CRT(Cathode Ray Tube), Random Scan Display & Systems, Raster Scan Display & Systems, DVST, Monochrome Monitors, Colour Monitors, Flat Panel Displays, LCD, PDP, Thin Film Electroluminescent Displays, LED Display, Display File & its Structure, Character Generation, BITBLT. **Scan Conversion:** DDA Line Drawing Algorithm, Bresenham's Line Drawing Algorithm, Circle Generating Algorithms: DDA Circle Drawing Algorithm, Midpoint. Circle Drawing Algorithm, Bresenham's Circle Drawing Algorithm, Ellipse Drawing Algorithm, Antialiasing, Dithering, Half Toning.

Unit II

2D-Transformations: Geometric Transformations: Translation, Rotation, Scaling, Shearing, Reflection, Homogenous Coordinates, Combined Transformations: Inverse Transformations, Rotations About an Arbitrary Point, General Fixed Point Scaling, Reflection Through an Arbitrary Line, Transformation between Coordinate Systems. **Polygons:** Inside and outside Test of Polygon, Even-odd Method, Winding Number Method, Polygon Filling: 4-connected and 8-connected pixel concept, Boundary Fill algorithm, Flood Fill Algorithm, Edge-Fill Algorithm, Fence Fill Algorithm. **Segments:** Segment Table, Functions for Segmenting the Display File, Creation of Segment, Closing the Segment, Deleting the Segment, Renaming a Segment, Posting and Unposting a Segment, Default Error Conditions, Appending to Segments, Visibility.

Unit III

Windows & Clipping: Viewing Transformation, Window- to- View Port Co-ordinate Transformation, Clipping: Point Clipping, Line Clipping: Cohen Sutherland Algorithm, Mid-point Subdivision, Polygon Clipping: The Sutherland-Hodgman Polygon-Clipping Algorithm, Weiler-Atherton Polygon Clipping, Curve Clipping, Text Clipping, Interior & Exterior Clipping, Generalized Clipping, Multiple Windowing. **Curve Generation:** Curve Generation Algorithm, Spline Representation, Piecewise Cubic Spline, Continuity, Cubic Bezier Curve, B-spline Curves, Bezier Surfaces and B-spline Surfaces, Beta-splines, Rational Splines, Octrees, BSP Tress, Fractals: Classification of Fractals, Geometric Construction of Statistically Self-Similar Fractals, Affine Fractal Construction, Hilbert's Curve.

Unit IV

3D Transformation: 3-D Translation, 3D-Scaling, Rotation: Rotation about z-axis, Rotation about x-axis, Rotation about y-axis, 3D Reflection, Multiple Transformation: Mirror Reflection with Respect to an Arbitrary Plane, Rotation about an Axis Parallel to a Coordinate Axis, Rotation About an Arbitrary Axis in Space, Scaling With Respect to Fixed Point. **Projections:** Concept of Projection, Parallel Projection: Orthographic Projection, Axonometric Projections, Oblique Projection, Perspective Projection: Transformation Matrix for Perspective Projection, Vanishing Points. **Hidden Lines and Surfaces:** Back-face Detection, Back-face Removal, z-Buffer Algorithm, A-Buffer Algorithm, The Painter's Algorithm, Binary-space Partition Method, Warnock's Algorithm (Area Subdivision Method), Scan Line Method, Floating Horizon Algorithm, Ray Tracing Algorithm.

Unit V:

Rendering & Illumination: Illumination Models: Light Sources, Diffuse Illumination: Lambert's Cosine Law, Point-Source Illumination, Specular Reflection: Phong Specular-Reflection Model, Combined Diffuse and Secular Reflections, Polygon-Rendering Method: Constant-Intensity Shading, Gouraud Shading, Phong Shading, Fast Phong Shading, Transparency, Shadow, Ray-tracing Methods: Basic-Ray-Tracing Algorithm, Ray Surface Intersection Calculations, Reducing Object Intersection Calculations, Antialiased Ray Tracing. **Color Models:** CIE Chromaticity Diagram, XYZ Color Model, Color Models, Different Color Models: RGB Color Model, CMY Model, CMYK Model, HSV Color Model, YIQ Color Model, HLS Color Model, HIS Color Model, Conversions between Color Models.

Suggested Readings:

1. D.Hearn & M. Pauline Baker, "Computer Graphics C Version", Pearson, 2010.

2. Steven Harrington, "Computer Graphics: A Programming Approach", 2nd ed., TMH, 1987.
3. Rogers, "Procedural Elements for Computer Graphics", TMH, 2009.
4. Rogers D., Adams .J, "Mathematical Elements of Computer Graphics", TMH, 2009.
5. Plastock & Kelly, "Computer Graphics; Schaum Series McGraw Hill

IMC-363: Web Technology & Application Development

Unit I

HTML And DHTML: Introduction and Role of Web Technology in Today's Scenario, Internet Protocols related to web, Introduction to Hypertext Markup Language (HTML), HTML Formatting Tags, Lists, Image, Tables, Links, Form Elements in HTML, Frames in HTML, Introduction to DHTML, Document Object Model (DOM), Cascading Style Sheet (CSS), Types of Style Sheets (In-line, External and Embedded).

Unit II

Scripting Languages (Java Script): Role of Scripting Languages in Web Development, History of JavaScript, Difference between Jscript and JavaScript, Data types, Operators, Control and Looping Structure, Arrays, User Define and Inbuilt Functions, String, Character and Date Functions, Document Object Model, Object Hierarchy in DOM, Event Handling, Writing Client-Side Validation fro HTML Form Elements.

Unit III

XML: Introduction to XML, Role of XML in Web Development, Differences Between HTML and XML, Structure of XML Documents, Difference between Well formed XML and Valid XML documents, Elements, Attributes and Entities in XML, Schema definition, Concept of Namespaces, Document Type Definition (DTD), Use of DTD, XML with CSS and XSL, Use of XSLT, SAX and DOM Parsers, XML Queries and XML Transformation.

Unit IV

Active Server Pages (ASP) and JAVA Server Pages (JSP): Role of ASP in Web Development, Working of ASP, Request, Response, Session, Server, Application, Object Context and ASP Error Objects, Server Object, Role of Session and Application Variable, Accessing the Database through ODBC. Introduction to Java Server Pages, JSP Architecture, JSP Application Design Interface, JSP tags, JSP Objects, Request and Response Objects in JSP, Business Processing in JSP, Accessing the Database through JDBC.

Unit V

PHP: Introduction to PHP, Data Types, Declaring Variables, HTML Forms and PHP, Decision Making and Control Structures, Strings, Arrays, Functions, Role of Cookies and Sessions, Handling Files and Directories, Database Connectivity using ODBC, Database Connectivity with MYSQL, Error handling.

Suggested Readings:

1. Xavier, C, "Web Technology and Design" New Age International Publications.
2. Ivan Bayross, "HTML, DHTML, Java Script, Perl & CGI", BPB Publications.
3. Ivan Bayross, "Web Technologies Part II", BPB Publications
4. Sharma & Sharma, "Developing E-Commerce Sites", Addison Wesley
5. Ramesh Bangia, "Internet and Web Design", New Age International.
6. Bhave, "Programming with Java", Pearson Education.
7. Ullman, "PHP for the Web: Visual Quick Start Guide", Pearson Education.
8. Deitel, "Java for Programmers", Pearson Education.
9. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill.
10. James L Mohler and Jon Duff, "Designing interactive web sites", Delmar Thomson Learning.
11. Anders Moller, Michael Schwartzcach, "An Introduction to XML and Web Technologies", Pearson, 2009.
12. Jeffrey C. Jackson, "Web Technologies- A Computer Science Perspective", Pearson, 2005.

IMC-364: Computer Communication and Computer Networks

Unit I

Data Transmission : Analog and Digital- Data, Signals, Transmission Systems, Asynchronous and Synchronous transmission; Analog and Digital Transmission; Bandwidth, Channel Capacity- Nyquist Bandwidth, Shannon Capacity Formula, Baud v/s Bit Rate, Transmission Impairments, , Modulation: Analog (Analog to Analog, Digital to Analog) and Digital(Analog to Digital, Digital to Digital).

Unit II

Data Transmission & Transmission Media: Multiplexing- FDM, TDM, WDM, Concepts of Frequency Spread Spectrum, Transmission Media (Guided, Unguided), Switching- Message, Circuit, Packet, Frame relay and Cell relay, Asynchronous Transfer Mode(ATM).

Unit III

Introduction to Computer Network: Types of Network: Based on Topology (Bus, Star, Ring Mesh, Tree); Based on Size Technology and ownership (LAN, MAN, WAN); Based on Computing (Centralized, Distributed and Collaborative), Based on Connection management (Connection-Oriented and Connectionless Oriented), Design Issues for the Layers, Interfaces and Services, ISO-OSI Reference Model and TCP/IP Model.

Physical Layer: Design Issues, Services provided to Upper Layer, Physical Layer Specification (Mechanical, Electrical, Functional and Procedural)

Unit IV

Data Link : Services provided to the Upper Layer, Framing, Error Control: CRC, Flow Control; Acknowledgement; IEEE Standards for MAC Sublayer; **Network Layer:** Services provided to the Upper Layer, Routing Algorithms (Centralized, Distributed and Isolated), Congestion Control(Token Based and Non Token Based), Internetworking (Negotiations across Subnet)

Unit V

Upper Layers: Transport Layer: Services provided to the Upper Layers, Elements of Transport Control Protocols-Physical Connection Management; Flow Control; Multiplexing; Host-To-Host Acknowledgement, Crash Recovery, Introduction to TCP and UDP, Brief Introduction of Session, Presentation & Application Layers and their functions.

Suggested Readings:

1. W. Stallings, "Data and Computer Communication", Pearson.
2. A. S. Tanenbaum, "Computer Network", 4th, Edition, Pearson Education.
3. Behrouz A. Forouzan, "Data Communication and Networking", TMH.
4. W. Stallings, "Computer Network with Internet Protocols", Pearson Education.

IMC-365: Financial Accounting and Management

Unit I

Introduction to Financial Accounting & Processes: Definition & Objective of Financial Accounting; Double Entry System of Financial Accounting; GAAP (Generally Accepted Accounting Principles); Accounting Concepts & Conventions; Process of Accounting-Book Keeping; Accounting Equations; Types of Accounts; Debit-Credit Rule; Vouchers; Journalisation of Transactions; Cashbooks; Ledger; Preparation of Trial Balance. Accounting Standards: Need & Importance of Accounting Standards

Unit II

Financial Statements: Capital Vs Revenue Expenditure; Manufacturing & Trading Account; Profit & Loss Account; Depreciation Accounting: Types of Depreciation, Straight Line Method, Reducing Method; Bank Reconciliation; Profit & Loss Appropriation Accounts; Corporate Balance Sheet.

Unit III

Financial Statement Analysis: Need, Importance & Usage of Financial Statement Analysis; Sources of Financial Statement Analysis; Tools & Techniques for Financial Statement Analysis. Financial Ratio Analysis: Classification of Ratios, Solvency, Profitability, Activity, Liquidity & Market Capitalization Ratios. Common Size Statement, Comparative Balance Sheet and Trend Analysis of Manufacturing, Service & Banking Organizations.

Unit IV

Financial Statement Analysis (Contd...): Funds Flow Statement: Concept of Gross & Net Working Capital; Preparation of Schedule of Change in Working Capital; Properties of Fund Flow Statement; Analysis of Fund Flow Statement; Usage Significance of Fund Flow Statement. Cash Flow Statement: Objectives & Significance of Cash Flow Statement; Cash & Non-Cash Transactions; Flow of Cash from Operating, Investing & Financing Activities; Preparation of Cash Flow Statements; Analysis of Cash Flow Statements. Cash Flow Statement Vs Fund Flow Statement, Usage & Limitations of Various Financial Statements.

Unit V

Introduction to Financial Management: Nature, Scope & Objective of Financial Management; Role of Financial Manager; Financial Goals: Profit Maximization Vs Wealth Maximization; Financial Decision Areas; Source of Medium & Long Term Finance. Time Value of Money, Compounding, Discounting, Future Value: Single Flow & Multiple Flow, Present Value: Risk & Return Analysis: Introduction to the Concept of Risk & Return. Financial Decisions: Investment Decisions; Dividend Decisions; Financing Decisions; Working Capital Decisions.

Suggested Readings:

1. Shukla & Grewal, "Advanced Accounts".
2. Khan & Jain, "Management Accounting".
3. Sehgal A., Sehgal D. , "Taxman's Financial Accounting".
4. R.P. Rustagi 'Financial Management' Taxman.

IMC-P361: Web Technology & Application Development Lab

1. Implementation of List Tags in HTML.
2. Implementation of Table Tag in HTML.
3. Implementation of Frameset Tag in HTML.
4. Implementation of different Form Tags in HTML.
5. Implementation of Cascading Style Sheet in Web Pages.
6. Implementation of control structure in Java Script.
7. Implementation of Looping structure in Java Script
8. Implementation of form validate in Java Script.
9. Implementation the XML to design the different documents.
10. Implement the schema Structure in XML document.
11. Implement the DTD to validate the XML document.
12. Implementation of database connectivity in ASP.
13. Implementation of Request Object in JSP.
14. Implementation of JDBC connection in JSP.
15. Implementation of mathematical functions in JSP.
16. 16 Implementation of arrays in JSP.
17. Implementation of Mail () Function in JSP.
18. Implementation of Session Object in JSP.
19. Implementation of Database Connectivity in JSP.

IMC-P362: Computer Graphics Lab

1. Write a program to draw a Line using DDA Algorithm
2. Write a program for implementing Bresenham's Algorithm for Line generation.
3. Write a program for implementing Bresenham's Algorithms for Circle generation.
4. Write a program for implementing Bresenham's Algorithms for Ellipse generation.
5. Write a program to demonstrate Cohen Sutherland Line Clipping Method.
6. Write a program to implement Sutherland- Hodgeman polygon clipping algorithm.
7. Write a program to rotate a triangle (By asking the user to input the coordinates of the triangle and the angle of rotation).
8. Write a program to perform one point perspective projection of an object.
9. Write a program to implement 3D rotation of an object.
10. Write a program to draw polyline using any algorithm.
11. Write a program to draw a Bezier curve and surface.

VII Semester

IMC-471: Computer Based Optimization Techniques

Unit I

Linear Programming Problem (LPP): Introduction to LPP, Components of LPP, Formulation of LPP, Graphical Solution of LPP, Exceptional Cases in Graphical Solution, Slack and Surplus Variable, Basic Solution, Basic Feasible Solution, Unbounded Solution, Infeasible Solution Optimal Solution, Standard and Matrix Form of LPP, Advantages, Applications and Limitation of LPP. Simplex Method, Pre Conditions of Simplex Method, Concept of Artificial Variables, Two-Phase Method, Big-M Method, Disadvantages of Big-M Method over Two-Phase Method.

Unit II

Dual Linear Programming Problem: Concept of Duality, Primal-Dual Relationship, Dual Simplex Method, Difference between Simplex and Dual Simplex Method, Advantage of duality, Revised Simplex Method, Advantages of Revised Simplex Method over Simplex.

Integer Programming Problem: Introduction, Difference between LPP and IPP, Mixed and All Integer IPP, Gomory's Cutting Plane Method, Branch and Bound Method, Geometrical Interpretation of Branch and Bound Method.

Unit III

Transportation Problem: Introduction and Applications of Transportation Problem, Basic Feasible Solution of Transportation Problem, North-West Corner Method, Matrix Minima Method, Row Minima Method, Column Minima Method, Vogel's Approximation Method, Degeneracy in TP, Loops in TP, Optimal Solution (U-V method), Unbalanced Transportation Problem.

Assignment Problem: Introduction and Application of Assignment Problem, Hungarian Algorithm for Assignment Problem, Maximization Case of AP, Unbalanced Assignment Problem.

Unit IV

Inventory Management: Introduction, Types of Inventories, Various Costs Involved in Inventory Decisions, Economic Order Quantity (EOQ), Determination of EOQ by Tabular Method and Graphical Method, EOQ Model without Shortage, EOQ model with Shortage, Inventory Model with Price-Break.

Replacement Problem: Concept of Replacement, Replacement without Considering Money Value, Present Worth Factor (PWF), Replacement Considering Money Value, Group Replacement.

Unit V

Queuing Theory: Introduction, Characteristics of Queuing System, Transient and Steady States, Memory-less Distribution, Exponential and Poisson Process, Markovian Property, Erlang Distribution, Distribution of Arrivals, Distribution of Service Times, Kendall's Notations, Pure Birth Process, Birth and Death Model.

Non Linear Programming Problem (NLPP): Introduction, Graphical Solution of NLPP Kuhn-Tucker Condition, Quadratic Programming, Wolf's Method.

Suggested Readings:

1. Gillet B.E.: Introduction to Operation Research, Computer Oriented Algorithmic approach - Tata McGraw Hill Publications.
2. P.K. Gupta & D.S. Hira, "Operations Research", S.Chand & Co Publications.
3. J.K. Sharma, "Operations Research: Theory and Applications", Mac Millan Publication.
4. S.D. Sharma, "Operations Research", Kedar Nath Ram Nath Publications.
5. S.S. Rao "Optimization Theory and Application", Wesley Eastern Publications.
6. Tata Hamdy, "Operations Research", Fifth Edition, Prentice Hall of India.
7. Taha H.A. "Operations Research --An Introduction", McMillan Publications.
8. Harvey M. Wagner, "Principles of Operations Research with Applications to Managerial Decisions", Prentice Hall of India.
9. Hillier and Liebermann, "Introduction to Operations Research", McGraw-Hill, 8th Edition, 2009.
10. Wayne Winston, "Operations Research: Applications and Algorithms", Cengage, 4th Edition, 2009.
11. Paul A. Jensen, "Operational Research Models and Methods", John Wiley, 2003.

IMC-472: Advance Computer Network

Unit I

Introduction: Protocols and standards, Standards Organizations, Internet Standards, Internet Administration; Overview of reference models: The OSI model, TCP/IP protocol Suite, Addressing, IP versions. Connectors, Transceivers and Media converters, Network interface cards and PC cards, Repeaters, Hubs, Bridges, Switches, Routers and Gateways.

Unit II

IPv6: Why IPv6, basic protocols, extension & option, support for QoS, Security, etc, neighbor discovery, auto-configuration, routing. Change to other protocols. Application Programming interface for IPv6. 6Bone.

Unit III

Mobility in Network: Mobile, Security related issues, IP Multicasting, Unicast Routing Protocols - RIP, OSPF, BGP), Multicasting Routing Protocols, Host Configuration: BOOTP AND DHCP

Unit IV

TCP extensions for high speed networks, Transaction oriented Applications, ARP, RARP, Internet Protocol, ICMP, IGMP, TCP, UDP, Introduction to Socket & Ports, Socket Class, Methods of Socket.

Unit V

Network Security at various layers, Secure-HTTP, SSL, PSP, authentication Header, Key distribution protocols, digital Signature, Digital Certificates, Firewalls.

Suggested Readings:

1. Behrouz A. Forouzan, "TCP/IP Protocol Suite", 3rd Edition, Tata McGraw Hill.
2. W. Stallings, "Data and Computer Communication", Pearson Education.
3. A. S. Tanenbaum, "Computer Network", 4th, Edition, Pearson Education.
4. Forouzan, "Data Communication and Networking", 2nd Edition, Tata McGraw Hill.
5. W. Stallings, "Computer Network with Internet Protocols", Pearson Education.
6. Eugene Blanchard "Introduction to Networking and Data Communications".
7. J. Martin "Computer Network and Distributed Data Processing", PHI.

IMC-473: Core Java

Unit I

Introduction to Object Oriented Programming Concept, Paradigm, Classes, Abstraction, Encapsulation, Inheritance, Polymorphism, Difference between C++ and JAVA. Introduction of Java, Java History The JDK Directory Structure, JDK Environment & tools like (java, javac, applet, viewer, javadoc, jdb), Java Features, Structure of Java Program, Compiling and Interpreting Applications, Java Tokens: Java character set, Keywords, Identifiers, Literals. Data types and Variables: Primitive Data types Declarations, Variable Names, Numeric Literals, Character Literals, String, String Literals, Arrays, Non-Primitive data types, The Dot Operator. Operators and Expressions, Implicit Type Conversions, The Cast Operator, Control Flow Statements. Introduction to Object-Oriented Programming, Type Casting Input and output-Scanner and System class-print(), println(), and printf() methods.

Unit II

Creating Classes and objects, Memory allocation for objects, Constructor, Implementation of Inheritance, Simple, Multilevel, Hierarchical, Implementation of Polymorphism, Method Overloading, Method Overriding, Threaded programming.
Strings: String, Arrays, String Methods, String Buffer class.

Unit III

Abstract Class, Interface and Packages, Modifiers and Access Control, Default, public private protected, Abstract classes and methods, Interfaces, Packages, Packages Concept, Creating user defined packages, Java Built in packages, Java.lang, Java.util.

Unit IV

Exception Handling: Exception types, Using try catch and Multiple catch, Nested try, throw, throws and finally, Creating User defined Exceptions.

Unit V

Applets and graphics programming , Graphics and Java 2D, Graphics contexts and Graphics objects, Color control, Font Control, Drawing Lines, Rectangles and Ovals, Introduction to AWT, working with frames. GUI components- Label, Textfield, Button, CheckBox, Textarea, JComboBox, List, Pannel . Common GUI Event types and Listener Interfaces- Mouse Event Handling , Adapter Classes, Key Event Handling, Layout Managers, Flowlayout, BorderLayout, GridLayout.

Suggested Readings:

1. E. Balagurusamy, "Programming with Java", Tata McGraw Hill.
2. Herbert Schildt, "Java 2 : Complete Reference", Tata McGraw-Hill
3. C. Muthu, "Programming in Java", 2nd Edition, Tata McGraw-Hill
4. Deitel & Deitel , "Java How to Program", 6th Edition, PHI Publication, 2005..

IMC-474: Client Server Computing

Unit I

Client/ Server Computing: DBMS concept and architecture, Single system image, Client Server Architecture, mainframe-centric client server computing, downsizing and client server computing, preserving mainframe applications investment through porting, client server development tools, advantages of client server computing.

Unit II

Components of Client/Server application: The client: services, request for services, RPC, windows services, fax, print services, remote boot services, other remote services, Utility Services & Other Services, Dynamic Data Exchange(DDE), Object Linking and Embedding(OLE), Common Object Request Broker Architecture(CORBA).

The Server: Detailed server functionality, the network operating system, available platforms, the network operating system, available platform, the server operating system.

Unit III

Client/Server Network: connectivity, Communication interface technology, interposes communication, wide area network topologies, network topologies (Token ring, Ethernet, FDDI, CDDI) network management, client server system development: software, client-server system Hardware: Network Acquisition, PC-level processing unit, Macintosh, notebooks, pen, UNIX workstation, x-terminals, server hardware.

Unit IV

Data Storage: magnetic disk, magnetic tape, CD-ROM, WORM, Optical disk, mirrored disk, fault tolerance, RAID, RAID-Disk network interface cards.
Network protection devices, Power protection Device, UPS, Surge Protectors.

Unit V

Client/ Server System Development: Training, Training advantages of GUI Applications, System Administrator Training, Database Administrator Training, User Training. The Future of Client- Server Computing Enabling Technologies, the Transformational System.

Suggested Readings:

1. Patrick Smith & Steave Guengerich, "Client Server Computing", PHI.
2. Dawna Travis Dewire, "Client Server Computing", Tata McGraw Hill.
3. Majumdar & Bhattacharya, "Database management System", Tata Mcgraw Hill.
4. Korth, Ssilberchartz, Sudarshan, "Database Concepts", Tata Mcgraw Hill.
5. Elmasri, Navathe, S. B, "Fundamentals of Database Systems", Addison Wesley.

IMC-475(A1): Advance Database Management System

Unit I

Evaluation of Relational Operators: Introduction to Query Processing; Access Paths; Preliminaries: Examples and Cost Calculations, The Selection Operation, No Index, Unsorted Data, No Index, Sorted Data, B+ Tree Index,, Hash Index, Equality Selection, General Selection Conditions , CNF and Index Matching, Evaluating Selections without Disjunction, Selections with Disjunction, The Projection Operation, Projection Based on Sorting, Projection Based on Hashing, Sorting versus Hashing for Projections, Use of Indexes for Projections The Join Operation, Nested Loops Join, Sort-Merge Join, Hash Join General Join Conditions, The Set Operations, Sorting for Union and Difference, Hashing for Union and Difference, Aggregate Operations, Implementing Aggregation by using an Index

Unit II

Relational Query Optimization: Overview of Relational Query Optimization, Query Evaluation Plans, Pipelined Evaluation, The Iterator Interface for Operators and Access Methods, The System R Optimizer; Translating SQL Queries into Algebra; Decomposition of a Query into Blocks, A Query Block as a Relational Algebra Expression; Alternative Plans; Pushing Selections, Estimating the Cost of a Plan; Relational Algebra Equivalence; Enumeration of Alternative Plans; Nested Queries; Other Approaches to Query Optimization

Unit III

Security, Views and SQL: Introduction to Database Security, Views; Destroying/ Altering Views, Queries on Views, Updates on views, Access Control, Discretionary Access Control; Grant and Revoke on Views and Integrity Constraints, Mandatory Access Control- Multilevel Relations and Polyinstantiation, Convert Channels, DOD Security levels, Additional Issues Related to Security, Role of Database Administrator, Security in Statistical Database, Encryption.

Unit IV

Physical Database Design and Tuning: Introduction to Physical Database Design: Database Workloads, Physical Design and Tuning Decisions, Need for Database Tuning, Guidelines for Index Selection, Basic Examples of Index Selection , Clustering and Indexing, Co-clustering Two Relations, Indexes on Multiple-Attribute Search Keys, Indexes that Enable Index-Only Plans, Overview of Database Tuning: Tuning Indexes, Tuning the Conceptual Schema, Tuning Queries and Views, Choices in Tuning the Conceptual Schema: Settling for a Weaker Normal Form, Renormalization, Choice of Decompositions, Vertical Decomposition, Horizontal Decomposition , Choices in Tuning Queries and Views, Impact of Concurrency , DBMS Benchmarking, Well-Known DBMS Benchmarks , Using a Benchmark

Unit V

Database Administration: The Role of Data and Database Administration, Modeling Enterprise Data, Planning for Databases, Managing Data Security, Backing Up Databases, Controlling Concurrent Access, Managing Data Quality, Data Dictionaries and Repositories.

Suggested Readings:

1. Raghu Ramakrishnan, Johannes Gehrke, "Database Managements Systems", McGraw Hill, Third Edition.
2. Jeffery A. Hoffer, Mary B. Prescott, Fred R. McFadden, "Modern Database Managements", Pearson Education.
3. Philip A. Bernstein, Eric Newcomer 2e, Morgan Kaufmann, "Principles of Transaction Processing".
4. Majumdar & Bhattacharya "Database Management system", TMH.
5. Hector Garcia Molina, Jeffery D. Ullman, Jeniffer Widom, "DataBase Systems- The Complete Book".
6. J. L. Warrington, "Object Oriented Database Design", Morgan Kaufman.
7. T. J. Tewrey, "Database Modeling and Design", Morgan Kaufman.
8. Mario Piattini, "Advanced Database Technology and Design", Artech House UK, 2000.
9. S. K. Singh, "Database Systems: Concept, Design, and Applications", Pearson Education.

IMC-475(B1): Information Representation and Network Security

Unit I

Introduction to Data Compression: Brief history of data compression applications, Overview of information theory, source coding, source models, Scalar Quantization theory. Text Compression Compact Techniques-Huffman coding, arithmetic coding-Shannon-Fano coding and dictionary techniques-LZW, Entropy measures of performance-Quality measures. Audio Compression Techniques-frequency domain and filtering-basic sub band coding-MPEG audio, progressive encoding for audio-silence compression, speech compression techniques-Vocoders

Unit II

Data Compression Techniques: Predictive techniques-PCM, DPCM, DM. Contour based compression-quadtrees, EPIC, SPIHT, Transform coding, JPEG, JPEG-2000, JBIG; Video signal representation, Video compression techniques-MPEG, Motion estimation techniques-H.261. Overview of Wavelet based compression and DVI technology, Motion video compression, PLV performance, DVI real time compression

Unit III

Introduction to Cryptography: Basic Terms-Plain Text, Cipher Text, Encryption, Decryption, Cryptography, Cryptanalysis, Cryptology, Secret Key, Cipher Principles-Security, Attacks, Services and Mechanisms, OSI Security Architecture, Symmetric Cipher Model, Classical Encryption Techniques-Substitution and Transposition Techniques, Steganography. Conventional Symmetric Encryption Algorithms- Theory of block cipher design, Feistel Cipher Network Structures, DES and Triple DES, Modes of Operation (ECB, CBC, OFB, CFB) , Modern Symmetric Encryption Algorithms- IDEA, Blowfish

Unit IV

Public and Private Key Cryptosystem: Principles of Public Key Cryptosystem, Key Management – Key Distribution, Placement of Encryption Function, RSA, Diffie-Hellman Key Exchange Algorithms , Chinese Remainder Theorem, Fermat’s Theorem and Euler’s Theorem, Euclid’s Algorithm; Hashes and Message Digests, Message Authentication, MD5, SHA-1, Digital Signatures, User Authentication, Digital Signature Standard (DSS and DSA), Digital Certificates and Public key Infrastructure-Private Key Management, Authentication of Systems -Kerberos V4, X.509

Unit V

Network Security: Email Security- PGP (Pretty Good Privacy), S/MIME, IP and Web Security-IPSec and Virtual Private Networks Secure Sockets and Transport Layer (SSL and TLS), Firewalls, Trusted Systems, Electronic Commerce Security- Secure Electronic Transaction (SET), Electronic Money Security, Security in GSM, Security in 3G, Case Studies on Cryptography and Security- Cryptographic Solutions using Java/ Microsoft .Net Framework, SSO, DOS Attacks, Secure Inter-branch Payment Transactions, Virtual Elections

Suggested Readings:

1. Khalid Sayood, “Introduction to Data Compression”, Morgan Kaufmann Publications.
2. Raif Steinmetz and Kiara Nahrstedt, “Multimedia Computing and communication and applications”, PHI
3. William Stallings, “Cryptography and Network Security- Principles and Practices”, Prentice Hall of India, Third Edition, 2003
4. Atul Kahate, “Cryptography and Network Security”, Tata McGraw-Hill, 2003.
5. Bruce Schneier, “Applied Cryptography”, John Wiley & Sons Inc, 2001.
6. Charles B. Pfleeger, Shari L. Pfleeger, “Security in Computing”, Third Edition, Pearson Education, 2003.
7. Christos Douligeris, Dimitrios N. Serpanos, “Network Security : Current Status and Future Directions”, Wiley –IEEE Press, 2007
8. Charles P. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Prentice Hall, 3rd Edition, 2003.

IMC-475(C1): Multimedia Systems & Animation

Unit I

Introduction to Multimedia System: Multimedia Fundamentals, Multimedia Skills, Multimedia Applications, Structure and Organizations, Media Streams Architecture and Components, Synchronization & Quality of Service (QOS).

Unit II

Multimedia Building Blocks: Audio and Speech-Data Acquisition, Sampling and Quantization, Human Speech, Digital Model of Speech Production, Analysis and Synthesis, Psycho-acoustics, Low Bit Rate Speech Compression, MPEG Audio Compression, Images and Video-Image Acquisition and Representation, Bi-level Image Compression Standards: ITU (formerly CCITT) Group III and IV Standards, JPEG Image Compression Standards, MPEG, H.264/AVC Video Compression Standards, Transcoding.

Unit III

Multimedia Hardware and Software: Macintosh and Window Productions Platform, Basic Software Tools-Text Editing and Word Processing Tools, Painting and Drawing Tools, 3 D Modeling and Animation Tools, Image Editing Tools, Sound Editing Tools, Animation, Video and Digital Movie Tools, Making Instant Multimedia, Multimedia Authoring Tools.

Unit IV

Specialized Multimedia Applications: Operating System Support for Continuous Media Applications, Media Stream Protocol, File System Support for Continuous Media, Data Models for Multimedia and Hypermedia Information's, Animations-General Computer Animation Functions, Raster animations, Animation Languages, Key Frame Systems- Morphing, Simulating Accelerations, Motion Specifications

Unit V

Multimedia Communication Systems: Architecture and issues for distributed multimedia systems- Distributed multimedia systems, Synchronizations, Orchestration, QOS Architecture, the role of standards, frame work for multimedia systems and knowledge based multimedia system: Introduction, Problems facing Multimedia system, The anatomy of an Intelligent Multimedia System.

Suggested Readings:

1. John F Koegel Buford, "Multimedia Systems", Pearson Education, Sixth Indian Reprint 2002.
2. Tay Vaughan, "Multimedia Making it Work", TMH, Fifth Edition.
3. Fred Halsall, "Multimedia Communications", Pearson Education, Second Indian Reprint 2002.
4. Nigel Chapman & Jenny Chapman, "Digital Multimedia", Wiley Publications.
5. Steve Heath, "Multimedia & Communication Systems", Focal Press, UK, 1999.
6. Keyes, "Multimedia Handbook", TMH, 2000.
7. Ralf Steinmetz and Klara Naharstedt, "Multimedia: Computing, Communications & Applications", Pearson, 2001.
8. Steve Rimmer, "Advanced Multimedia Programming", PHI, 2000.
9. Ze-Nian Li. And mark S. Drew, "Fundamentals of Multimedia", PHI, 2010.

IMC-475(D1): Artificial Intelligence

Unit I

Scope of AI: Games, Theorem Proving, Natural Language Processing, Vision And Speech, Processing, Robotics, Expert Systems, General Issues and Overview Of AI, AI Techniques, AI Problems.

Intelligent Agents: Definitions Of A Rational Agent, Reflex, Model-Based, Goal-Based, And Utility-Based Agents, The Environment In Which A Particular Agent Operates.

Problem Solving : State Space Search; Production Systems, Search Space Control; **Uninformed Search:** Depth-First, Breadth-first search.

Introduction to LISP: Syntax and Numeric Functions, Basic List, Manipulation Functions in LISP

Unit II

Informed /Heuristic Search: Heuristic Search, Hill Climbing, Best-First Search, A*, AO* Search, Branch And Bound, Problem Reduction, Constraint Satisfaction End, Means-End Analysis.

Knowledge Representation: Predicate Logic: Unification, Modus Ponens, Resolution In Predicate Logic, Conflict Resolution Forward Chaining, Backward Chaining, Declarative And Procedural Representation, Rule Based Systems

LISP (Continued): Functions, Predicates And Conditionals, Input, Output, And Local Variables, Iteration And Recursion, Property Lists And Arrays.

Unit III

Structured Knowledge Representation: Semantic Nets: Slots, Exceptions And Default Frames, Conceptual Dependency, Scripts.

Game Playing: Game Tree, Minimax Algorithm, Alpha Beta Cutoff, Modified Minimax Algorithm

Introduction To PROLOG: List, Operators, Arithmetic, Objects, Relationships, Facts, Rules And Variables.

Unit IV

Natural Languages and NLP, Syntactic Processing, Parsing Techniques, Semantic Analysis, Case Grammar, Augmented Transition.

Handling Inconsistent And Incomplete Knowledge: Truth Maintenance Systems, Reasoning Techniques, Concept Of Uncertainty, Bayes' Theorem, Certainty Factors And Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic: Fuzzy Sets, Fuzzy Operators & Arithmetic, Membership Functions, Fuzzy Relations

PROLOG (Continued): Syntax and Data Structures, Representing Objects & Relationships By Using "Trees" And "Lists", Cut & Fail, Backtracking

Unit V

Learning: Concept of Learning, Learning Automation, Rote Learning, Genetic Algorithm, Learning By Inductions, Artificial Neural Nets, Expert Systems: Need and Justification for Expert Systems, Knowledge Acquisition. AI: Present and Future

Case Studies: Mycin, Black Board System

Suggested Readings:

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach" (2nd ed.), Pearson Education, 2005.
2. Elaine Rich and Kelvin Knight, "Artificial Intelligence", Tata McGraw Hill, 2002.
3. Eugene Charniak and Drew McDermott, "Introduction to Artificial Intelligence", Pearson Education, 2009.
4. Nils J. Nilson, "Principles of Artificial Intelligence", Narosa Publishing House, 2001
5. R. Akerkar, "Introduction to Artificial Intelligence", Prentice-Hall of India, 2005
6. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall of India, 2006.
7. Nils J Nilson, "Artificial Intelligence: A New Synthesis", Morgan Kaufmann Publishers, Inc., San Francisco, California, 2000.
8. Clocksin and C.S. Mellish, "Programming in PROLOG", Narosa Publishing House, 2002.

9. Saroj Kaushik, "Logic and Prolog Programming", New Age International Publisher, 2006
10. R. J. Schalkoff, "Artificial Intelligence-an Engineering Approach", McGraw Hill Singapore, International Editions, 1992.
11. George F. Luger, "Artificial Intelligence-Structures and Strategies For Complex Problem Solving", Pearson Education, 5th Edition, 2010.

IMC-P471: Core Java Lab

1. Implementation of Fundamental Data Types & Testing and Debugging of Programs
2. Implementation of Basic Control Constructs such as loops etc
3. Implementation of Advance Control Constructs such as Arrays etc..
4. Implementation of classes & objects
5. Implementation of Methods in Java.
6. Implementation of constructors.
7. Implementation of Inheritance
8. Implementation of Polymorphism.
9. Implementation of String Handling.
10. Implementation of Abstract Class, Interfaces & Packages.
11. Implementation of String Handling.
12. Implementation of Input Output Streams.
13. Implementation of Exception Handling.
14. Implementation of Event Handling
15. Implementation of Applets for display of Images, Texts and Animations etc.
16. Use of AWT controls
17. Use of Layout Manager for creating different applications.
18. Write a Program to implement Simplex Method to solve LPP.
19. Write a Program to implement Dual Simplex Method to solve LPP.
20. Write a Program to implement Assignment Problem using Hungarian Algorithms.
21. Write a Program to implement North-West Corner Rule in Transportation Problem
22. Write a Program to implement Vogel's Approximation Method in Transportation Problem.

IMC-P472: Advance Computer Network Lab

1. Implementation of CRC algorithm in C.
2. Implementation of a Hamming code to limit the noise. We have to code the 4 bit data in to 7 bit data by adding 3 parity bits. Implementation will be in C.
3. Write a program to simulate ARP/ RARP protocol.
4. Write a program to perform bit stuffing on the sender side.
5. Write a program to remove the extra bits from the received bits.
6. Write a program to simulate the sliding window protocol for Go back n.
7. Write a program to simulate the sliding window protocol for Selective reject.
8. Write a program to simulate the Stop and Wait protocol.
9. Write a program to download a file using RS232 interface.
10. Write a program for client Server chat application.
11. Write a program to find the port address for service name.
12. Write a socket program to implement a listener and a talker.
13. Write a Program to find the address of the local machine
14. Write a Program that prints the address of www.youtube.com
15. Write a program to enter the IP address of any node and check whether a particular node is reachable from the current host

VIII Semester

IMC-481: Advance Java

Prerequisite: Java History, Java Features, Java Tokens - Java character set, Keywords, Identifiers, Literals, Operators, Separators, Java Statements, Creating the program, Compiling the program, Running the program, Constants, Variables, Data Types, Declaration of Variables, Scope of Variable, Symbolic Constants, Conditional and Looping Statement, String Buffer class, Vectors, Wrapper Classes, Java Beans.

Unit I

Distributed Objects: The Roles of Client and Server, Remote Method Invocation (RMI): N-tier Architecture, Distributed object technologies, RMI Architecture, Locating & loading Remote classes, Locating remote objects & providing references to them, Setup for Remote Method Invocation, Parameter Passing in Remote Methods Server Object Activation, Unicast Remote Object, Socket Vs RMI programming.

Unit II

Java Database Connectivity (JDBC): Introduction to JDBC, JDBC Installation, JDBC Drivers Type, Connection, JDBC-ODBC Bridge Driver. Driver Manager Class, Java. SQL Package (Connection Interface, Statement Interface, JDBC URLs, Statements-Creating Executing Closing, Result Set-Data Types and Conversions, Prepared Statement, Callable Statement, Mapping SQL and Java Types, Prepared Statement Interface, Result Set Interface, Result Set Meta Data Interface, SQL Exception class, Advanced Connection Management, Introduction of LDAP.

Unit III

Enterprise Java Beans (EJB): Introduction, Architecture of EJB, EJB Servers, Containers, EJB Implementation, Remote Interface of Beans, EJB Sessions Beans, Transactions and EJB Deployment, Writing EJB Clients.

Unit IV

Java Servlets: Introduction to Server Side Technologies, Overview of Servlets, Common Gateway Interface (CGI), The JAVA Servlet Architecture, Servlet Life cycle, HttpServlets, GenericServlets, init(),service(), doGet(), doPost(), destroy() , Servlets & JDBC. Requests and Responses, Retrieving Form Data in a Servlet, Session Tracking Cookies.

Unit V

STRUTS: Introduction to Struts, Overview on MVC Design Pattern, How the Struts Framework Applies MVC, How requests are handled in Struts, Struts main Components, A sample program.

Web Services: Introduction to Web Services, Working of Web Services, Web API.

Understanding SOA and Web Services; Descriptions and messaging; Coordination, Orchestration, and Choreography; Advanced Messaging, Metadata, and Security; Service Orientation Principles; Application and Business Layers; Service Orientated Analysis; SOA Design - WSDL and SOAP; Service Design; WS-BPEL; WS-* Extension

HIBERNATE: Introduction to Hibernate: Technology Overview & Benefits, Architectural Overview: Mapping Techniques, Understanding the Hibernate type system, Understanding object identity, Fine-grained object models, Mapping class inheritance, Working with compound keys, Mapping collections of value types, Mapping entity associations, Mapping polymorphic associations.

SPRING: Introduction to Spring, Spring Framework., Use of Spring technique in Java.

Integration of STRUTS, SPRING and HIBERNATE in a Web Application.

Suggested Readings:

1. E. Balagurusamy, Programming with Java, Tata McGraw Hill.
2. Patrick Naughton and Herbertz Schildt, "Java 2.0: The Complete Reference", TMH, 1999.
3. Ivon Bayross, "Web technologies", BPB Publication.
4. Deitel & Deitel, "Java How to program", Prentice Hall, 4 th Edition, 2000.

5. Gary Cornell and Cay S. Horstmann, "Core Java Vol 1 and Vol 2", TMH.
6. Stephen Asbury, Scott R. Weiner, Wiley, "Developing Java Enterprise Applications", 1998.
7. Java 6 Programming black books Kogent solutions published by dreamtech press edition 2007
8. SOA for The Business Developer, B. Margolis (with J. L. Sharpe), MC Press, 2007.
9. Web Services Platform Architecture, S. Weerawarana, F. Curbera, F. Leymanm, T. Storey and D. F. Ferguson, Pearson Education, 2005.
10. Hibernate in Action, Christian Bauer and Gavin King, Manning Publications Co., 2004
11. Ethan Cerami, "Web Services", O'REILLY Media, 2002.

IMC-482: Software Project Management

Unit I

Introduction to Project Management: What is a Project, Advantages of project management, Examples of information technology projects, Project attributes; what is Project Management, Project stakeholders, Project management knowledge areas, Project management tools and techniques, Project success factors; The Role of the Project Manager: Job description, Skills for project manager, Ethics in Project Management, Project Management Software?

Unit II

Information Technology Context and Process Groups in Project Management: A Systems View of Project Management, A systems approach, The three-sphere model for systems management, Stakeholder Management, The importance of top management commitment, The need for organizational commitment to information Technology, The need for organizational standards, Project Phases and the Project Life Cycle, The Context of Information Technology Projects, The nature of information technology projects, Characteristics of information technology project team members, , Diverse Technologies, Project Management Process Groups, Mapping the Process Groups to the Knowledge Areas

Unit III

Project Integration Management: Project Integration Management, Strategic Planning and Project Selection, Identifying potential projects, Methods for Selecting Projects, Focusing on broad organizational needs, Categorizing information technology projects, Performing Net Present Value Analysis, Return on Investment and Payback Analysis, Project Charters, Preliminary Scope Statement, Project Management Plans, Project Execution, Monitoring and Controlling Project Work, Integrated Change Control, Closing Projects

Unit IV

Project Scope Management: Scope Definition and the Project Scope Statement, Creating the Work Breakdown Structure, Scope Verification, Scope Control, Improving user input, Suggestions for reducing incomplete and changing requirements

Project Time Management: Importance of Project Schedules and Time Management, Activity Definition, Activity Sequencing, Activity Resource Estimating, Activity Duration Estimating, Schedule Development, Gantt Charts, Critical Path Method (CPM), Program Evaluation and Review Technique (PERT)

Project Cost Management: Importance and Principles of Project Cost Management, Cost Estimating, Types of cost estimates, Cost estimation tools and techniques, Cost Budgeting, Cost Control,

Project Quality Management: Importance of Project Quality Management, Quality planning, Quality assurance, Quality control, Tools and Techniques for Quality Control, Pareto analysis, Statistical sampling, Testing, ISO standards for quality, Cost of Quality

Unit V

Project Human Resource Management: Motivation theories, Maslow's hierarchy of needs, Improving effectiveness, Human Resource Planning, Project organizational charts, Responsibility assignment matrices, Management plans and resource histograms, Acquiring the Project Team, Resource assignment, Resource loading, Resource leveling, Developing the Project Team, Managing the Project Team

Project Risk Management: The Importance of Project Risk Management, Risk Management Planning, Qualitative Risk Analysis, Quantitative Risk Analysis

Project Procurement Management: Tools and Techniques for Planning Purchases, Make or buy analysis, Expert judgment, Procurement Management Plan, Planning Contracting, Requesting Seller Responses and Selecting Sellers, Administering and Closing the Contract.

Suggested Readings:

1. Kathy Schwalbe, "Information Technology Project Management", 4th ed., THOMSON Course Technology, 2007
2. Bob Hughes and Mike Cotterell, "Software Project Management", 4th ed., Tata McGraw-Hill
3. Ramesh, Gopalaswamy, "Managing Global Projects ", Tata McGraw Hill, 2001

4. Royce, "Software Project Theory", Pearson Education, 1999.
5. Pankaj Jalote "Software Project Management In Practice", Pearson Education, 2000
6. S.A. Kelkar, "Software Project Management: A Concise Study", 2nd ed., Prentice Hall
7. Liffingwell, "Managing Software Requirements: A Use Case Approach", Pearson Education.
8. Tom Gilb, "Principles of Software Engineering Management", Addison Wesley, 1988.
9. Watts Humphrey, "Managing the Software Process", Addison Wesley, 1995.

IMC-483: Compiler Design & Construction

Unit I

Introduction: Compilers & Translators, Types, Computational Model: Analysis & Synthesis, Phases of Compiler & Analysis of Source Code, Passes vs Phases Relatives of the Compiler, Interpreter, Abstract Interpreter, Case Tool, A Simple Compiler Example, Decompilers, Just-in-Time Compilation, Cross Compiler, Bootstrapping, Macro, X-Macros.

Programming Language Design: Goals & Design Philosophies of Programming Languages, Detailed Design: Micro Structure, Expression Structure, Data Structure, Control Structure, Compile Structure, I/O Structure, Reduction of Size.

Unit II

Introduction to Source Code & Lexical Analysis:

Source Code: Purposes, Organization, Licensing, Quality, Phrase Structure & Lexical Structure, The Structure of the Program.

Lexical Analyzer: Role, Token, Lexeme, Pattern, Function Word, Lex Programming Tool, Complete C Program for LEX, Flex Lexical Analyzer.

Syntax Analysis & Directed Translation: Syntax Definition, Problem of Syntax Analysis or Parsing, Syntax Directed Translation, Syntax Tree, Attribute Grammar, Dependency Graph, Parsing, Parser Development Software, Complete C Program for Parser.

Unit III

Semantic Analysis: Type Theory, Type System, Type Checking, Type Inference, Type System Cross System List, Types of Types, Type Conversion, Signature, Type Polymorphism, Overloading, Complete C Program for Semantic Analysis.

Three Address Code Generation: Intermediate Languages, Intermediate Representation, Boolean Expressions, Intermediate Code for Looping Statements, Intermediate Code for Array, Back patching, Static Single Assignment Form.

Unit IV

Code Optimization: Types of Optimizations, Aim of Optimization, Factor Affecting Optimization, Basic Block, Control Flow Graph, Common Optimization Algorithms, Problems of Optimization, Data Flow Analysis, Loop Optimization, Data Flow Optimization, SSA Based Optimizations, Functional Language Optimizations, Other Optimization Techniques.

Code Generation: Code Generator Optimizations, Use of Generated Code, Major Tasks in Code Generation, Instruction Selection, Instruction Scheduling, Register Allocation, Code Generation for Trees, The Target Machine, Abstract Machine, Object File, Complete C Program for Code Generation.

Unit V

Symbol Table: Operation on Symbol Table, Symbol Table Implementation, Data Structure for Symbol Table, Symbol Table Handler.

Run Time Management: Program, Subprogram, Subroutine, Co routine, Procedure, Function, Activation Tree, Activation Record, Storage Allocation Strategies, Parameter Passing, Scope Information.

Error Detection & Recovery: Error Representation, Sources of Errors, Lexical Phase Errors, Syntax Error Detection & Recovery, Semantic Errors.

Suggested Readings:

1. Alfred V. Aho & Jeffrey D. Ullman, "Compilers: Principles, Techniques, and Tools", Pearson, 2010.
2. R. Singh & Manish Varshney, "Design & Implementation of Compiler", New Age International Publisher, First Edition, 2009
3. Davis Galles, "Modern Compiler Design", Pearson, 2010.
4. J.P. Tremblay & P.G.Sorenson, "The Theory & Practice of Compiler Writing", BS Publications, 2005.
5. K. C. Louden, "Compiler Construction, Principle and Practice", Cengage Publication, 6th Edition, 2009.
6. S.S. Muchnick Harcourt Asra, "Advanced Compiler Design Implementation", Morgan Kaufman, 2006.
7. Allen, "Modern Compiler Implementation in C", Cambridge University Press, 1997.
8. Alan I. Holub, "Compiler Design in C", PHI, 2009.

IMC-484: Information Storage Management

Unit I

Introduction to Storage Technology: Data proliferation and the varying value of data with time & usage, Sources of data and states of data creation, Data centre requirements and evolution to accommodate storage needs, Overview of basic storage management skills and activities, The five pillars of technology, Overview of storage infrastructure components, Evolution of storage, Information Lifecycle Management concept, Data categorization within an enterprise, Storage and Regulations.

Unit II

Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, Logical partitioning of disks, RAID & parity algorithms, hot sparing, Physical vs. logical disk organization, protection, and back end management, Array caching properties and algorithms, Front end connectivity and queuing properties, Front end to host storage provisioning, mapping, and operation, Interaction of file systems with storage, Storage system connectivity protocols.

Unit III

Introduction to Networked Storage: JBOD, DAS, SAN, NAS, & CAS evolution, Direct Attached Storage (DAS) environments: elements, connectivity, & management, Storage Area Networks (SAN): elements & connectivity, Fibre Channel principles, standards, & network management principles, SAN management principles, Network Attached Storage (NAS): elements, connectivity options, connectivity protocols (NFS, CIFS, ftp), & management principles, IP SAN elements, standards (SCSI, FCIP, FCP), connectivity principles, security, and management principles, Content Addressable Storage (CAS): elements, connectivity options, standards, and management principles, Hybrid Storage solutions overview including technologies like virtualization & appliances.

Unit IV

Introduction to Information Availability: Business Continuity and Disaster Recovery Basics, Local business continuity techniques, Remote business continuity techniques, Disaster Recovery principles & techniques.

Unit V

Managing & Monitoring: Management philosophies (holistic vs. system & component), Industry management standards (SNMP, SMI-S, CIM), Standard framework applications, Key management metrics (thresholds, availability, capacity, security, performance), Metric analysis methodologies & trend analysis, Reactive and pro-active management best practices, Provisioning & configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools overview.

Suggested Readings:

1. Information Storage and Management Storing, Managing, & Protecting Digital Information, by EMC, Hopkinton & Massachusetts, Wiley, ISBN: 9788126521470

IMC-485(A2): Distributed Database

Unit I

Distributed Data Base - An Overview: Distributed Database Management System, Features of Distributed versus Centralized Database, Levels of Distributed Transparency: Reference Architecture for Distributed Database, Types of Data Fragmentation, Distributed Transparency for Read-Only applications, Integrity Constraints in Distributed Database. Framework for Distributed Database Design, the Design of Database Fragmentation, the Allocation of Fragments.

Unit II

Query Transformation & Optimization: Equivalence Transformation for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries. Framework for Query Optimization, Join Queries, General Queries.

Unit III

Transaction Management: Framework for Transaction Management, Supporting Atomicity of Distributed Transaction, Concurrency Control for Distributed Transaction.

Unit IV

Distributed Concurrency Control: Foundation of Distributed Concurrency Control, Distributed Deadlock, Concurrency Control Based on Timestamps, Nonblocking Commitment Protocols.

Unit V

Reliability & Distributed Transaction: Reliability and Concurrency Control, Determining a Consistent View of Network, Detection and Resolution of Inconsistency, Checkpoint and Cold Restart.

Distributed Database Administration: Catalog Management in Distributed Database, Authorization and Protection.

Suggested Readings:

1. S. Ceri, G. Pelagatti, "Distributed Database: Principles and Systems", McGrawHill, New York, 1985.
2. M. Tamer Ozsu, "Principles of Distributed Database Systems", Pearson Education.
3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill, 2002
4. David Bell, Jane Grimson, "Distributed Database Systems", Addison-Welley.
5. O. H. Bray, "Distributed Database Management Systems", Lexington Books.
6. W. Draffman & F. Poole, "Distributed Database - An Advance Course", Cambridge University Press.
7. M. T. Ozsu, U Dayal and P. Valduriez (editors), "Distributed Object Management", Morgan-Kaufmann.
8. A. Dogac, M. T. Ozsu, A. Billiris, and T. Sellis (editors), "Advances in Object-Oriented Database System, Springer-Verlag.
9. Chhanda Ray, "Distributed Database System", Pearson, 2009.

IMC-485(B2): Mobile Communication Systems

Prerequisite: Modulation Techniques, Frequency Spread Spectrum, Multiple Access Control.

Unit I

Introduction to Wireless Communication: History of Cellular Systems, Fundamentals of Cellular Systems, Cellular Infrastructure, Cell Area, Cell Capacity, Frequency Reuse, Co-Channel Interference, Cell Splitting, Cell Sectoring; **Wireless Transmission:** Frequency for Radio Transmission, Signals, Antennas, Signal Propagation.

Unit II

Channel Allocation: Fixed, Dynamic, Hybrid, Flexible; **Wireless LAN:** Infrared, Bluetooth Architecture & Protocol Stack; Overview of the IEEE 802.11 Standard, IEEE 802.16/16a Standard for WiMAX, 802.11a/b/g/n (Wi-Fi); **Wireless Public Networks:** Wi-Max.

Unit III

Mobile Communication Systems: Architecture: Base Station Subsystem (BSS): Base Trans-receiver Station (BTS), Base Station Controller (BSC), Base Station, Mobile Station, Network & Switching Subsystem (NSS): Mobile Switching Center (MSC), Registration, Handoff Parameters, Roaming **Support using System Backbone:** Home Agents, Foreign Agents, **Mobile IP:** Goals, Assumption & Requirements, IP Packet Delivery, Agent Discovery, Registration, Tunneling & Encapsulation; **Adaptive Clustering for mobile networks:** Multi-Cluster Architecture, Cluster Algorithm, Cluster Maintenance.

Unit IV

Advanced Mobile Phone Systems (AMPS): Characteristics, Operation & Working; **Global System for Mobile Communications(GSM):** Frequency Bands & Channels, Frames in GSM, Identity Number used in GSM, Layers, Planes & Interfaces; **Satellite Systems:** Types & Characteristics of Satellite Systems, Satellite Systems Infrastructure; **Global Positioning System (GPS):** Limitations & Beneficiaries; General Packet Radio Services (GPRS).

Unit V

IMT & UMTS: Deployment and future development of IMT (International Mobile Telecommunications)-2000/UMTS (Universal Mobile Telecommunication System), Overview on IMT-2000 radio access technologies, UMTS specification series, UMTS Architecture; **Cellular Systems Generations:** 1G, 2G, 2.5G / 2.75G, 3G (IMT 2000), 3.5G/4G; CDMA One / IS 95 CDMA (2G), CDMA 2000, Migration from GSM to UMTS (WCDMA).

Suggested Readings:

1. William Stallings, "Wireless Communications & Networks", Pearson Education, 2nd Edition 2009.
2. Jochen Schiller, "Mobile Communications, Pearson Education, 2nd Edition, 2003.
3. Dharma Prakash Agrawal & Qing-An Zeng "Introduction to Wireless & Mobile Systems", Thomson Brooks/Cole, 2nd Edition 2003.
4. Krzysztof Wesolowski, "Mobile Communication Systems ", John Wiley & Sons, Ltd.
5. Ron Olexa, "Implementing 802.11, 802.16 and 802.20 Wireless Networks, Elsevier
6. Friedhelm Hillebrand, "GSM and UMTS, The Creation of Global Mobile Communication, John Wiley & Sons, Ltd
7. Dr. Ing. Wolfgang Granzow, "3rd Generation Mobile Communications Systems (Mobile Communications Systems II)"
8. Charles Perkins, "Adhoc Networks", Addison Wesley Publication.
9. Yi Bing Lin, "Wireless and Mobile Networks Architecture", John Wiley & Sons.
10. Tomasz Imielinski et. Al, "Mobile Computing", Kluwer Academic Press.
11. UWE Hansmann, Other Merk, Martin-S-Nickious, "Principles of Mobile Computing", Springer Verlag International Edition.

IMC-485(C2): Virtual Reality Systems

Unit I

Introduction to Virtual Reality: Introduction, The Three I's of Virtual Reality, Virtual Commercial, VR technology and the five classic components of a VR system, PC Graphics Architecture, Workstation-Based Architectures, Distributed VR Architecture, Sensor Hardware, Head Coupled Displays, Acoustic hardware, Integrated VR System.

Unit II

Basic Virtual Concepts: Virtual World Space, Positioning, Perspective Projection, Human Vision, 3D Clipping, Illumination Models, Reflection Models, Shading algorithms, Radiosity, stereographic Images, Realism.

Unit III

VR Modeling: Geometric Modeling- Virtual Object Shape, Object Visual Appearance Kinetic Modeling- Homogeneous Transformation Matrix, Object Position, Transformation Invariants, Object Hierarchies Physical Modeling- Collision Detection, Surface Deformation, Force computation, Force Smoothing & Mapping, Behavior Modeling, Model Management.

Unit IV

VR Programming: Toolkits and scene graphs , World Tool Kit- Model Geometry & Appearance, Scene Graph, Sensors & Action Functions, WTK Networking, Java 3 D- Model Geometry & Appearance, Scene Graph, Sensors & Behaviors, Java 3 D Networking, WTK & Java 3 D- Performance Comparison ,General Haptics, Open Software Toolkit-GHOST Integration with the graphics Pipeline, The GHOST Haptics Scene Graph, Collision Detection and Response.

Unit V

Human Factors in Virtual Reality and Virtual Applications: Methodology and Technology, User performance and studies , VR Health and Safety Issues , VR and Society, Traditional VR applications- Medical, Education, Arts & Entertainment, Military Applications, Emerging Applications of VR- Manufacturing, Robotics & Information Visualization

Suggested Readings:

1. John Vince, "Virtual Reality System", Second Indian Reprint 2002.
2. Grigore C. Burdea, Philippe Coiffet, "Virtual Reality Technology", Wiley India, Second Edition.
3. R.Carey, G. Bell, "The Annotated VRML 2.0 References", Addison Wesley.1997.

IMC-485(D2): Decision Support System & Business Intelligence

Unit I

Introduction: Changing Business Environments and Computerized Decision Support, Managerial Decision Making, Computerized Support for Decision Making, An Early framework for Computerized Decision Support, The Concept of Decision Support Systems, A Framework for Business Intelligence, A Work System View of Decision Support, The Major Tools and Techniques of Managerial Decision Support.

Unit II

Computerized Decision Support-Decision Making, Systems, Modeling, and Support: Decision making: introduction and Definitions, Models, Phases of the Decision-Making Process: The Intelligence Phase, Design Phase, implementation Phase, How Decision are Supported.

Unit III

Decision Support Systems Concepts, Methodologies, and Technologies: Decision Support System Configurations, Decision Support System Description, Decision Support System Characteristics and Capabilities, Decision Support System Classification, Components of Management Subsystem, The Decision Support System User, Decision Support System Hardware.

Unit IV

Modeling and Analysis: Management Support Systems Modeling, Structure of Mathematical Models for Decision Support, Certainty, Uncertainty, and Risk, Management Support Systems Modeling with Spreadsheets, Mathematical Programming Optimization, Multiple Goals, Sensitivity Analysis, What-if Analysis, and Goal Seeking, Decision Analysis with Decision Tables and Decision Trees, Multicriteria Decision Making with Pairwise Comparisons, Problem-Solving Search Methods, Simulation, Visual Interactive Simulation, Quantitative Software Packages and Model base Management.

Unit V

Business Intelligence and Data Mining: Data Mining Concept and Applications, Data Mining Process, Data Mining Methods, Data Mining Software Tools

Implementing Decision Support Systems and Business Intelligence: RFID and New BI Application Opportunities , Reality Mining, Virtual Worlds, The Web 2.0 Revolution, Virtual Communities, Online Social Networking: Basics Examples, Cloud Computing and BI, The Impacts Of management Support Systems: An Overview, Management Support Systems Impacts on Organizations, Management Support Systems Impacts on Individuals, Automating Decision Making and the Manager's Job, Issues of legality, Privacy, and Ethics.

Suggested Readings:

1. Turban, Sharda, & Delen, "Decision Support and Business Intelligence System", 9th ed., Pearson Education
2. Carlo Verzellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley
3. Efreem G Mallach, "Decision Support and Data Warehouse Systems", Tata McGraw Hill
4. Larissa Moss & Shaku Atre "Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-Support Applications", Addison-Wesley Information Technology Series
5. Sam Anahony, "Data Warehousing in the real world: A practical guide for building decision support systems", John Wiley & Sons, 2004.

IMC-P481: Advance Java Lab

1. Implementation of RMI Applications.
2. Creation of Bank Account Client/Server Using RMI
3. Implementation of DataBase Connectivity To Create a Table.
4. Implementation of DataBase Connectivity To insert Records in existing DataBase.
5. Implementation of DataBase Connectivity To delete Records from DataBase.
6. Implementation of DataBase Connectivity To Modify Records in existing DataBase.
7. Implementation of Beans & Enterprise Beans
8. Implementation of Java Beans to illustrates the procedure of handling session and print a Hello world using Java Bean
9. Implementation of Enterprise java Bean.
10. Implementation of Servlets to Handle Get Method.
11. Implementation of Servlets to Handle Post Method.
12. Implementation of Servlets to generate Plain Text.
13. Implementation of Servlets to generate HTML.
14. To implement the use of Java Beans, JSP and Servlet to work together.
15. Use of STRUTS Framework, Web services, SPRING & HIBERNATE in a Web Applications.

IMC-P482: Compiler Design & Construction Lab

1. Write a Program to count no. of words, lines, spaces and characters.
2. Write a Program to implement a Finite Automata to recognize identifier.
3. Write a Program a program in C/C++ for identification of following sequence keyword, operators identifiers (if, then, else, for, while, int, char).
4. Write a Program in C to read a text file and convert all the lexeme into stream of token (another file).
5. Write a Program for text editors in 'C' language for DOS environment.
6. Write a LEX program in UNIX for identification of following sequence, keywords, operators, identifiers.
7. Write a LEX program to solve an expression where LEX returns token.
8. Write a Program for YACC to solve an expression where YACC define grammar rule for solving expression.
9. Write a Program for recursive descent parser.
10. Write a Program to implement LL (1) Parser.
11. Write a Program to implement LR (0) Parser.
12. Simulation of a Finite state Automata to recognize the tokens of various control statements.
13. Simulation of a Finite state machine to distinguish among Integers, Real Numbers & Numbers with Exponents.
14. Program in LEX tool to recognize the tokens and to return the token found for a C like Language
15. Parsing of arithmetic and algebraic expressions and equations.
16. Use of YACC tool to parse the statements of C like Language.

IX Semester

IMC-591: Open Source Software

Unit I

Introduction: Introduction to Open sources, Need of Open Sources, Advantages of Open Sources, and Applications of Open Sources, Social, Psychological, Legal, and Economic Aspects of Open Source: Licenses, Copyright, Patent, Open Source Operating Systems: LINUX: Introduction, General Overview, Kernel Mode and user mode, Process, Advanced Concepts, Scheduling, Personalities, Cloning, Signals, Development with Linux. Case Studies: Ubuntu Linux 7.10.

Unit II

Open Source Database: MySQL: Introduction, Setting up Account, Starting, Terminating and Writing your own SQL Programs, Record Selection Technology, Working with Strings, Date and Time, Sorting Query Results, Generating Summary, Working with Metadata, Using Sequences, MySQL and Web.

Unit III

Open Source Programming Languages: PHP: Introduction, Programming in Web Environment, Variables, Constants, Data Types, Operators, Statements, Functions, Arrays, OOP, String Manipulation and Regular Expression, File Handling and Data Storage, PHP and SQL Data Base, PHP and LDAP, PHP Connectivity, Sending and Receiving E-mails, Debugging and Error Handling, Security, Templates.

Unit IV

Python: Syntax and Style, Python Objects, Numbers, Sequences, Strings, Lists and Tuples, Dictionaries, Conditionals and Loops, Files, Input and Output, Errors and Exceptions, Functions, Modules, Classes and OOP, Execution Environment, Web based Content Management System(WCMS): Drupal, Joomla, Word Press, Case Studies: Apache, Berkeley Software Distribution, Linux, Mozilla Firefox, Wikipedia, , GNU Compiler Collection, Open Office.

Unit V

Open Source Tools & Technologies: Web Server: Apache Web server, working with Web Server, Configuring and Using apache web services, WAMP(Windows, Apache, MySQL, PHP) Server, Model Driven Architecture(MDA): Introduction to MDA, Genesis of MDA, Meta Object Facility, UML, UML Profiles, and MDA Applications.

Suggested Readings:

1. James Lee, Brent Ware, "Open Source Web Development with LAMP", Pearson Education.
2. Fadi P. Deek, James A. M. McHugh, "Open Source, Technology and Policy", Cambridge University Press.
3. Kailash Vadera, Bhavyesh Gandhi, "Open Source Technology", University Science Press.
4. Karl Fogel, "Producing Open Source Software".
5. Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003.
6. Steve Suchring, "MySQL Bible", John Wiley, 2002.
7. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002.
8. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2001.
9. Peter Wainwright, "Professional Apache", Wrox Press, 2002.
10. Stephen J. Mellor, Marc Balces, "Executable UML: A foundation for MDA", Addison Wesley, 2002.
11. Robert Love, "Linux System Programming", O'Reilly Media, 2nd Edition 2007.
12. Christopher Diaz, "Introduction to Unix", Pearson, 3rd Edition, 2009.
13. Mark G. Sobell, "A Practical Guide to Ubuntu Linux", Pearson, 2nd Edition, 2008.
14. Peterson Richard, "The Complete References Linux", Tata McGraw Hill, 2nd Edition 2000.

IMC-592: .Net Framework & C#

Unit I

.Net Framework: Introduction to .Net technology, Origin of .Net Technology, Framework Components, Common Language Runtime(CLR),Managed and Unmanaged Code, Role of Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Concept of Metadata, Just-In-Time Compilation (JIT), MS.Net Memory Management (Garbage Collection), Base Classes, Ms.Net Namespaces.

Unit II

C# Basics: The Evolution of C#, Introduction to C#, Data Types, Identifiers, Variables, Constants, Literals, Type Conversion and Casting, Operators (Arithmetic Operators, Relational and Logical Operator, Assignment Operator, Bitwise Operators, Shift Operators, Conditional Operator), Checked and Unchecked Blocks-Overflow Checks, Enum, Arrays, Array List, Strings, Control Statements and Looping (If Statement, Switch Statement, For Loop, While Loop, Do-While Loop, For each Loop), Object and Classes, Properties(Read, Write), Indexers, Inheritance (Multilevel and Hierarchical), Polymorphism (Operational and Inclusion), Operator Overloading, Interfaces, Delegates and Events, Boxing and Unboxing.

Unit III

C# Libraries: Input output (Streams Classes), Multithreading , Networking and Sockets, Managing Consol I/O Operations, Windows Forms (A Skeletal Form-Based Windows Program, Handling Messages, Adding a Menu), Debugging, Exceptions and Error Handling.

Unit IV

.Net Advance Features: ASP.NET Web Form Controls (User Controls. Server Controls), Windows Applications, Remoting (Server Activated Object, Client Activated Object, Marshalling, Marshal-by-value, Marshal-by-reference), Web Services (UDDI, DISCO, WSDL), ADO.NET(Architecture, Difference between Dataset and Data Reader, Connection and Command Object), Distributed applications, Reflection, Globalization and Localization, Authentication and Authorizations, XML in .NET.

Unit V

.NET Assemblies: .NET Assemblies, Type of Assemblies, GAC (Global Assembly Cache), Concept of Strong Names, Caching Concepts (Page Output Caching, Page Fragment Caching),State management (Session Object, Hidden Fields, View State, Cookies, Cross page posting), Introduction to Generics, Global ASAX Files, Web Configuration and Machine Configuration Files.

Suggested Readings:

1. Balagurusamy "Programming with c# ", Tata McGraw Hill Publication.
2. Shibbi Panikkar and Kumar Sanjeev, "C# with .Net Framework", Firewall Media.
3. "ASP.NET 3.0 Black Book", Dreamtech Press.
4. "Beginning ASP.NET3.0", WROX Publication.
5. Tony Baer, Jan D. Narkiewickz, Kent Tegels, Chandu Thota, Neil Whitlow, "Understanding the .Net Framework".
6. Jesse Liberty and Donald Xie, "Programming C# 3.0", O'REILLY.
7. Stephen C. Perry, Atul Kahae, Stephen Walther, Joseph Mayo, "Essential of .NET and Related Technologies with a focus on C#, XML, ASP.net and ADO.net", Pearson, 2nd Edition, 2009.

IMC-593: Cloud Computing

Unit I

Cloud Computing Basics: What Is Cloud Computing? , Cloud Components, Infrastructure, Services Applications-Storage, Database Services, Intranets and the Cloud -Components, Hypervisor Applications, First Movers in the Cloud –Amazon, Google, Microsoft , Benefit, Limitations.

Unit II

Cloud Computing Technology: Hardware and Infrastructure , Clients-Mobile , Thin, Thick, Security-Data Leakage , Offloading Work, Logging , Forensics , Development , Auditing , Network-Basic Public Internet , The Accelerated Internet , Optimized Internet Overlay , Site-to-Site VPN , Cloud Providers, Cloud Consumers , Pipe Size , Redundancy , **Services:** SaaS, Paas, IaaS; **Platform as a service:** Accessing the Cloud Platforms - Web Application Framework , Web Hosting Service , Proprietary Methods , Web Applications, Web APIs , Web Browsers -Internet Explorer , Firefox , Safari , Chrome.

Unit III

Storage as a Service: The Basics , Storage as a Service , Providers , Security , Reliability , Advantages , Cautions, Outages, Theft , Cloud Storage Providers -Amazon Simple Storage Service (S3) ,Nirvanix, Google Bigtable Datastore , MobileMe , Live Mesh.

Software as a Service: Advantages, Software Considerations, Vendor Advantages, Limitations, Driving Forces-Popularity.

Unit IV

Virtualization Benefits , SaaS and SOA , Economic Impact , Local Clouds and Thin Clients, Virtualization in Your Organization-Why Virtualize?, How to Virtualize?, Virtualization Concerns, Security aspects of Virtualization, Server Solutions-Microsoft Hyper-V, VMware, VMware Infrastructure , Banking—Open Channel , Thin Clients-Sun, Hewlett Packard , Dell.

Unit V

Security Management in the Cloud: Security Management Standards , Security Management in the Cloud , Availability Management, SaaS Availability Management , Platform As a Service (PaaS) Availability Management, Infrastructure As a Service (IaaS) Availability Management Access Control , Security Vulnerability, Patch, and Configuration Management, Conclusion and the future scope of the Cloud-Analyst Predictions , Survey Says? , Security in Cloud Computing, Program Guidance for CSP Customers, The Future of Security in Cloud Computing. Relevant Case Studies (atleast TWO)

Suggested Readings:

1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter-“Coud Computing a Practical Approach” .
2. B.Furht; A. Escalante -“Handbook of cloud computing” .
3. Majd F. Sakr -“Introduction to Cloud Computing” .
4. Tim Mather, Subra Kumarswamy, Shaheed Latif-“Cloud Security and Privacy” .

IMC-594(A3): Data Warehousing & Data Mining

Unit I

Introduction to Data Mining: Data Mining Functionalities, Classification of Data Mining Systems, Integration of Data Mining System with a Database or Data Warehouse System

Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

Unit II

Data Warehousing and OLAP Technology: Data warehousing Components, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Metadata, Reporting and Query Tools and Applications, Online Analytical Processing (OLAP) - OLAP and Multidimensional Data Analysis.

Unit III

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts of Association Rules, Efficient and Scalable Frequent Item set Mining Methods, Mining Various Kinds of Association Rules, Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Introduction, Bayesian Classification, Rule Based Classification, Associative Classification, Lazy Learners, Other Classification Methods, Prediction.

Unit IV

Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

Unit V

Advance Topics:

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Suggested Readings:

1. Jiawei Han and Micheline Kamber "Data Mining Concepts and Techniques" Second Edition, Morgan Kaufmann Publishers
2. Margaret H. Dunham "Data Mining: Introductory and Advanced Topics", Pearson Education
3. George M. Marakas "Modern Data Warehousing, Mining, and Visualization: Core Concepts", Pearson Education
4. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw - Hill Edition, Tenth Reprint 2007.
5. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
6. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
7. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.
8. W. H. Inmon, "Building the operational data store", John Wiley & Sons, 2nd Ed. 1999.
9. Jarke, "Fundamentals of Data Warehouse", Springer.
10. A. B. M. Shawkat Ali, Saleh A. Wasimi, "Data Mining Methods and Techniques", Cengage Learning, 2009.

IMC-594(B3): Network Programming

Unit I

Introduction: Data Communication Model, Concept of Client-Server Communication, Connection Oriented and Connectionless Services, ISO-OSI Reference Model, TCP/IP Protocol Suite, Connection Management in TCP, Classfull Internet Addresses, Subnetting, Supernetting, Well-known and Empirical Port, Unix Standards; Novell's IPX/SPX Protocol Stack, Protocol Comparison among ISO-OSI, TCP/IP, IPX/SPX.

Unit II

Berkeley Socket Programming Part I

Sockets: Introduction, Distinction between Sockets and Connections, Socket Abstraction, Socket Address Structures, Socket System Calls, Reserved Ports, Elementary TCP Sockets, TCP Client-Server, I/O Functions: Select and Poll, Socket Options, UDP Sockets, Name and Address Conversions.

Unit III

Berkeley Socket Programming Part II

Advanced Sockets: IPV4 and IPV6 Interoperability, Daemon Processes and Superserver, Unix Domain Protocols, Routing Sockets, Threads, Raw Sockets.

Client-Server Interaction: Connection Oriented Client-Server Interaction, Connection less Client-Server Interaction, Iterative and Concurrent Servers, Multiprotocol and Multiservice Servers.

Unit IV

Windows Socket Programming: Windows Sockets, WinSock Network Model, OSI Layers in WinSock, Modular Boxes, Services & Protocols, Protocols & APIs. Client Server Model, Socket Operations & Operation modes, Socket States, Host Name, Address Resolution, Host Table, DNS, NIS, Addresses & Formatting, Socket Control, Socket Options, Socket Names; Support Routines; Porting from BSD Sockets, Inter Platform Operability.

Unit V

Simple Network Management: SNMP Network Management Concepts, SNMP Management information, Standard MIBs, SNMP V1 Protocol and Practical issues, Introduction to RMON, SNMP V2 & SNMP V3.

Suggested Readings:

1. W. Richard Stevens, "Unix Network Programming, Volume 1- Networking APIs: Sockets and XTI", Second Edition, Prentice-Hall of India, 2002.
2. Bob Quinn/Dave Shute, "Windows Socket Network Programming", Pearson Education.
3. Davis R., "Windows Network Programming", Addison Wesley, 1993.
4. Douglas E. Comer, "Internetworking with TCP/IP", Volume I, II & III, Second Edition, Prentice-Hall of India, 2003.

IMC-594(C3): Digital Image Processing

Unit I

Digital Image Fundamentals and Transforms : Elements of Visual Perception – Image Sampling and Quantization, Basic Relationship between Pixels, Basic Geometric Transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier Transform, FFT, Separable Image Transforms, Walsh Hadamard Discrete Cosine Transform, Haar, Slant – Karhunen Loeve-Transforms.

Unit II

Image Enhancement Techniques: Spatial Domain Methods: Basic Grey Level Transformation, Histogram Equalization, Image subtraction, Image Averaging, Spatial Filtering: Smoothing, sharpening Filters – Laplacian Filters, Frequency Domain Filters, Smoothing-Sharpening, Filters, Homomorphic-Filtering.

Unit III

Image Restoration: Model of Image Degradation/Restoration process, Noise Models, Inverse Filtering, Least Mean Square Filtering, Constrained Least Mean Square Filtering, Blind Image Restoration, Pseudo Inverse, Singular Value Decomposition.

Unit IV

Image Compression: Lossless Compression: Variable length Coding – LZW Coding, Bit Plane Coding, Predictive Coding -DPCM. Lossy Compression: Transform Coding, Wavelet Coding, Basics of Image Compression Standards: JPEG, MPEG Basics of Vector quantization.

Unit V

Image Segmentation and Representation: Edge Detection, Thresholding, Region Based Segmentation, Boundary Representation: chain codes, Polygonal Approximation, Boundary Segments, Boundary Descriptors: Simple Descriptors, Fourier Descriptors, Regional Descriptors, Watershed Algorithm and Use of Motion in Segmentation, Morphology.

Image Recognition & Interpretation: Elements of Image Analysis, Pattern & Pattern Classes, Decision Theoretic Methods, Structural Methods, Interpretations.

Suggested Readings:

1. Rafael C Gonzalez, Richard E Woods “Digital Image Processing”, Pearson Education, 2003.
2. William K Pratt, “Digital Image Processing”, John Willey 2003.
3. Millman Sonka, Vaclav Hlavac, Roger Boyle, Broos Colic, Thompson Learniy “Image Processing Analysis and Machine Vision”, 1999.
4. A.K. Jain, “Fundamentals of Digital Image Processing”, PHI, New Delhi, 1995.
5. Chanda Dutta Magundar, “Digital Image Processing and Applications”, PHI, New Delhi, 2002
6. Rosefield Kak, “Digital Picture Processing”.

IMC-594(D3): Artificial Neural Network

Unit I

Introduction to Neural Networks: Introduction to Neural Networks, Basic Concepts of Neural Networks, Inference and Learning, Classification Models, Association Models, Optimization Models, Self-Organization Models. Humans & Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

Unit II

Essentials of Artificial Neural Networks: Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN, Connectivity, Learning Strategy, Supervised and Unsupervised Learning, Statistical Learning, AI Learning, Neural Network Learning, Rule Based Neural Networks, Network Training, Network Revision, Issues, Theory of Revision- Decision Tree Based NN, Constraint Based NN

Unit III

Single Layer Feed Forward Neural Networks: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete & Continuous Perceptron Networks, Limitations of the Perceptron Model.

Unit IV

Multilayer Feed forward Neural Networks: Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements, Radial Basis-Function-Networks.

Unit V

Recurrent Networks and Associative Memories:

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Applications of Artificial Neural Networks to Process Identification, Control, Fault Diagnosis, Function Approximation, Regression, Classification, Blind Source Separation, Time Series and Forecasting.

Suggested Readings:

1. Jacek M. Zurada "Introduction to Artificial Neural Systems", Wordpress, 2006.
2. Li Min Fu , "Neural Network in Computer Science", McGraw-Hill Publication, 2003.
3. Haykin Simon, "Neural Networks- A Comprehensive Foundation," Prentice Hall International, New Jersey, 1999.
4. R. L. Harvey, " Neural Network Principles", PHI Publication, 1st Edition
5. Anderson J. A. "An Introduction to Neural Networks", PHI, 1999
6. Freeman J. A., Skapura D. M., "Neural Networks: Algorithms, Applications & Programming Techniques", Addison Wesley, Massachusetts, 1992.
7. S. Rajasekharan and G. A. Vijayalakshmi pai, "Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications", PHI Publication, 2004.
8. N. P. Padhy, "Artificial Intelligence and Intelligence Systems", Oxford University Press, 2005.

IMC-595(A4): Enterprise Resource Planning

Unit I

Pre History of ERP, Concept of ERP System, Reasons to go for ERP, Need of ERP, Evolution of ERP, Structure of ERP, Concept of Material Requirement Planning (MRP), Manufacturing Resource Planning (MRP II), Common Misconception about ERP, Benefits of ERP, Disadvantages of ERP, ERP and Related Technologies, MIS (Management Information System), DSS (Decision Support System), EIS (Executive Information System), Data Warehouse, Data Mining.

Unit II

BPR (Business Process Reengineering), How ERP is related with BPR, Barriers to the Success of BPR; Role and Importance of Data Warehouse in ERP, Role of Data Mining in ERP; Supply Chain Management (SCM), Evolution and Components of SCM, Characteristics of SCM, How ERP is related with SCM; Role and Need of Customer Relationship Management, Integration of ERP, SCM and CRM.

Unit III

ERP Modules, Finance, Plant Maintenance, Quality Management, Material Management; Domain of ERP as well as areas affected by ERP e.g. Aerospace, Automobiles etc.; Market Players SAP, JD Edwards, BANN, PeopleSoft, Oracle Etc., ERP market in Indian Context; Assemble-To-Order, Make-To-Order, Make-To-Order, Just in Time (JIT); Hidden Costs involved in ERP Implementation, Planning and Project Management, Training, Data Conversion, Dirty Data, Integration Testing, Data Analysis.

Unit IV

ERP Implementation Lifecycle, Evaluation Criteria for ERP Product, Integrating ERP into organizational Culture, Critical Factors in the Success and Failure of ERP, ERP Success inhibitors, Return On Investment of ERP Implementation, Useful Guidelines for ERP Implementation, Role of Vendors in ERP Implementation, Evaluation Criteria for Vendors, Role and Need of ERP Consultants, Role of End Users in ERP Implementation, Training of End Users, Motivation for End Users.

Unit V

ERP and Internet, ERP and E-Commerce, How ERP interoperate E-Commerce, Future Directions in ERP, New Evolving Markets, Faster Implementation Methodologies, New Business Segments, Concept of Extended ERP, e-ERP, e-CRM, e-SCM, Case Study on SAP, ORACLE, People Soft etc.

Suggested Readings:

1. Alexis Leon, "Enterprise Resource Planning Demystified", Tata McGraw-Hill Publishing Company Ltd., New Delhi.
2. Mahadeo Jaiswal and Ganesh Vanapalli, "Text Book of Enterprise Resource Planning", Macmillan India Ltd., Chennai.
3. Vinod Kumar Garg and N.K. Venkitakrishnan, "Enterprise Resource Planning- Concepts and Practice", Prentice Hall of India, New Delhi.
4. Rahul V. Altekar "Enterprisewide Resource Planning", Tata McGraw Hill.
5. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology.
6. Mary Summer, "Enterprise Resource Planning", Pearson Education.

IMC-595(B4): Distributed Systems

Unit I

Introduction: Introduction to Distributed systems-examples of distributed systems, challenges-architectural models- fundamental models - Introduction to interprocess communications-external data representation and marshalling- client server communication-group communication – Case study: IPC in UNIX

Unit II

Distributed Operating System Support: The operating system layer – Protection - Process and threads - Communication and invocation - Operating system architecture - Introduction to time and global states - Clocks, Events and Process states - Synchronizing physical clocks - Logical time and logical clocks - Global states - Distributed debugging – Distributed mutual exclusion.

Unit III

Distributed Objects & File System: Introduction Communication between distributed objects - Remote procedure call - Events and notifications - Java RMI case Study - Introduction to DFS - File service architecture - network file system - Introduction to Name Services- Name services and DNS - Directory and directory services

Distributed Memory Management

Unit IV

Transaction and Concurrency Control- Distributed Transactions- Nested transaction – Locks - Optimistic concurrency control - Timestamp ordering - Comparison of methods for concurrency control - Introduction to distributed transactions - Flat and nested distributed transactions - Atomic commit protocols - Concurrency control in distributed transactions - Distributed deadlocks - Transaction recovery.

Unit V

Security and Replication: Overview of security techniques - Cryptographic algorithms – Digital signatures - Cryptography pragmatics – consistency and Replication - System model and group communications – Fault tolerance, Highly available services – Transactions with replicated data.

Suggested Readings:

1. A.S.Tanenbaum, M.Van Steen “ Distributed Systems” Pearson Education 2004.
2. Mukesh Singhal, Ohio State University, Columbus “Advanced Concepts In Operating Systems” McGraw Hill Series in Computer Science, 1994.
3. George Coulouris, Jean Dollimore, Tim Kindberg “Distributed Systems Concepts and Design” Third Edition – 2002 Pearson Education Asia.
4. Liu, “Distributed Computing: Principles and Applications”, Pearson Education.

IMC-595(C4): Graphical User Interface Design

Unit I

Introduction to User Interface & User Interface Design: What is User Interface? Types of User Interfaces and their suitability to various Interactive Applications, Factors affecting selection of appropriate User Interface for Interactive Applications, Usability of Interactive Systems: Guidelines, Principles, and Theories; User Interface Design Methodology; Development Environment and Platforms for UI Design and Implementation

Unit II

Introduction to GUI: Definition of Graphical User Interface and scope of its usage in various types of Interactive Applications; Characteristics of a good GUI; GUI Challenges, Common Reasons for GUI success and failure; Usability factors and Rules of perception for an effective GUI; User Profiling, User Analysis, Characteristics of different User Types; Factors of User Analysis affecting GUI Design; Identification of different tasks affecting the GUI Design; Information Visualization; Hardware and Software Development factors for an effective GUI; Brief introduction of various IDEs for GUI Design and Development

Unit III

GUI Design and Implementation Part I: GUI Design Principles: Design Consistency, User-Centricness and Feedback, Filtering Information, Creation of a Conceptual Model of GUI; GUI Standards; GUI Design Process, Techniques for implementing effective GUI; GUI Modeling Techniques; GUI Prototyping: Prototype Designing, Costs and Benefits of Prototyping, Success Factors in Prototyping

Unit IV

GUI Design and Implementation Part II: Window Design: Components of a Window, Drawing Icons and Pointers, Window Navigation Techniques; Types of Windows, Common Window Attributes, Modal vs. Modeless Windows and their usage, Various Presentation Models and when to use each type ; Tab and Multi-form Window display techniques; Control Design: Common GUI controls and their usage & behavior; GUI Control Designing; Techniques for effective Menu Design and Usage; Applying the principles of effective GUI Design; Designing On-line Help System, Error Handling; Usability Testing

Unit V

Advanced GUI Design: Web-Based GUI Design and its Issues: Differences in Browsers, Differences in Security Permissions, Delivery of Add-ons etc; Challenges for Web Based GUI: HTML and Higher Level Object Abstraction, Provision of state in stateless environment, Distinction and separation of GUI from Business Object Layer, Client and Server side validations etc; Case Studies of IDEs for GUI Building on .NET and JAVA Platforms; Future Directions of GUIs and IDEs

Suggested Readings:

1. Ben Shneiderman, Catherine Plaisant, Maxine Cohen, and Steven Jacobs. "Designing the User Interface: Strategies for Human-Computer Interaction", 5th Edition. Pearson Education
2. Hix, D., Hartson, H.R., "Developing User Interfaces. Ensuring Usability Through Product & Process", John Wiley & Sons, Inc., New York, 1993.
3. Newman W.M., Lamming M.G., "Interactive System Design". Addison Wesley, 1996.
4. Susan Weinschenk, Pamela Jamar and Sarah C. Yeo, "UI Design Essentials", Wiley.
5. Alan J Dix, Janet E. Finlay, G.D. Abowe and Rusell Beale, "Human Computer interaction, 2/e", Prentice Hall.
6. Willbert Galitz, "Essential Guide to User Interface Design", John Wiley.

IMC-595(D4): Modern Intelligent Systems

Unit I

Expert System: Overview, Introduction to rule-based expert systems, General introduction, Forward and backward chaining, Rule-based expert systems, Expert System Shells, Other expert system paradigms, Case-based reasoning, Recommender systems, Scheduling, Building expert systems, Discussion of shells, Knowledge Management, Machine learning and data-base mining, Decision Trees, Neural Networks, Web mining, Current trends of expert system.

Unit II

Fuzzy Logic: Fuzzy Set theory: motivation, possibilistic interpretation, basic concepts, set operations, fuzzy relations, and fuzzy inferences. Fuzzy Sets Applications: Approximate Reasoning, fuzzy arithmetic, decision theory, fuzzy controllers (development, tuning, compilation, deployment), cluster analysis. Hybrid soft computing systems using fuzzy, neural, and evolutionary systems; systems development and case studies. Special Topics: Probabilistic reasoning (Bayesian Belief Networks, Dempster-Shafer), Case-based Reasoning, Evolutionary Multi-Objective Optimization (EMOO).

Unit III

Evolutionary Programming: Biological and artificial evolution, Evolutionary computation and AI, Different historical branches of EC-GAs, EP-ES, GP, A simple evolutionary algorithm. Recombination/Crossover for strings, one-point, multi-point-uniform crossover operators, Mutation for strings, bit-flipping, Recombination/Crossover and mutation rates, Recombination for real, valued representations, Fitness proportional selection and fitness scaling, Ranking methods, Tournament selection. Common techniques, penalty methods, repair methods, Analysis, Some examples, Pareto optimality, Multi objective evolutionary algorithms.

Unit IV

Genetic Algorithm: Biological evolution and genetics, Genetic Algorithms (GA): fitness, reproduction, mutation, The Schema Theorem in GA, Genetic programming and how it differs from GA, The creation and regeneration of populations: crossover, mating, and reproduction, Classic GP problems and their solutions: Santa Fe Trail, lawnmower, numeric regression, boolean circuit design, drawbacks with crossover, Introns, bloat, building blocks, the schema theorem, the problem with variable length representation.

Unit V

Swarm Intelligence: Introduction to swarm intelligence and key principles, natural and artificial examples, computational and real-time SI, Foraging, trail laying/following mechanisms. From real to virtual ants: Ant System (AS), the first combinatorial optimization algorithm based on ant trail/following principles. Application to a classical operational research problem: the Travel Salesman Problem (TSP). From AS to Ant Colony Optimization (ACO). Ant-based algorithms (ABC, Ant-Net) applied to routing in telecommunication networks. Collective sorting and division of labor, collective construction, firefly synchronization, flocking birds and autonomous vehicles.

Suggested Readings:

1. Goldberg and David E, "Genetic Algorithms in Search. Optimization and Machine Learning", Pearson Education, New Delhi, 2006.
2. Kalyamoy Deb, "Multiobjective Optimization using Evolutionar Algorithms", John Wiley & Sons, First Edition, USA, 2003.
3. N. P. Padhy, "Artificial Intelligence and Intelligence Systems", Oxford University Press, 2005.
4. Bonabeau E., Dorigo M., and Theraulaz G., "Swarm Intelligence: from natural to artificial systems", Oxford University Press, 2001.
5. Joseph C. Giarratano and Gary D. Riley, "Expert Systems: Principles and Programming", Fourth Edition, PWS. Publishing, New York, 2004.
6. Lawrence J. Fogel, "Intelligence Through Simulated Evolution: Forty Years of Evolutionary Programming" Wiley Publications, 1999.

7. David E. Goldberg, "Genetic Algorithms in Search, Optimization, and Machine Learning", Addison-Wesley Publishing Company.
8. Bart Cosko, "Fuzzy Thinking: The New Science of Fuzzy Logic", Hyperion, New York.
9. G. J. Klir & T.A. Folyger, "Fuzzy Sets Uncertainty & Information", PHI, 1988.
10. G. J. Klir & B. Yuan, "Fuzzy Sets & Fuzzy logic", PHI, 1995.

IMC-P591: Open Source Software Lab

1. PHP Core Programming Lab
2. MySQL Lab
3. Working with Templates
4. Working with Javascript
5. Working with Local Host Web Server like (Wamp, Xaamp, Easy PHP etc.)
6. Working with JQuery and FlexGrid Plugin.
7. A Mini Project Development using Open Source Technologies studied.

IMC-P592: .Net Framework & C# Lab

1. Implementation of Decision Making and Branching Statements on Console Applications.
2. Implementation Iterative Statements on Console Applications.
3. Implementation of Enum on console Applications.
4. Implementation of Arrays on Console Applications.
5. Implementation of ArrayList on Console Applications.
6. Implementation of Strings on Console Applications.
7. Implementation of Inheritance and Polymorphism on Console Applications.
8. Implementation of Interfaces on Console Applications.
9. Construct the C# console application to implement the Operator Overloading.
10. Implementation of Delegates and Events on Console Applications.
11. Implementation of Server Side Controls in asp.net.
12. Implementation of Database Connectivity in asp.Net
13. Implementation of various Data Rendering Controls in asp.Net.
14. Implementation of Web Services in asp.Net Applications.
15. Implementaation of Remoting in asp.Net Applications.