B.R.A. BIHAR UNIVERSITY

MUZAFFARPR

SYLLABUS

OF

M.C.A.

(Masters in Computer Application)

(Semester System)

B. R. A. BIHAR UNIVERSITY MUZAFFARPUR

SYLLABUS OF MCA COURSE

CS 101 : Introduction to Computing and It's Applications

Computer System, Classification of computers, Transistors, Integrated Circuits(LSI, VLSI), Operation of processor, Number System, Digital Circuits, ALU, Memory Chips(RAM, ROM, DRAM), storage Devices, Memory Hierarchy, I/O Devices, Bus System, Operating System: Windows and Linux, Network communication infrastructure, Protocols, Wireless LAN Mobile Computing, Web Technology, The Internet and Intranet, WWW, Java fundamentals, Multimedia Application, e-Commerce.

Text/Reference Books:

1. **Fundamentals of computer** : *V.Rajaraman*
2. **The Essential Guide to computing**: *The Story of Information Technology, E.Garrison Walters, PHI, 2001.*
3. **Introduction to Computing System**: *From Bits to Gates to C and Beyond. Yale N. Patt and Sanjay J. Patel, Prentice Hall India, 1999.*

CS 102 : Mathematical Foundation

Discrete structures and Significance, Fundamental Discrete Structure, Sets, Sequences, Product Set, Relation and Computing Significance, Permutation, Combination, Recurrence Relations, Fundamental proof Techniques, Partial Orders and Poset, External Elements Lattices, Finite Boolean Algebras, Boolean Function and Polynomial, Propositions, Logical Connectives and Operation, Conditionals, Bi-conditionals, Contradiction, Contrapositive. Tautology, contingency and Contradiction, Transformation to Propositional Forms Reasoning Using Equivalence Transformation. Rules of Substitution and Inferences, Normal Forms: DNF, CNF, PDNF, PCNF, Graph, it's types and Computing Significance, Graph as a DATA Structure, Eulerian and Hamiltonian Paths, and Circuits. Alphabets, Strings and Languages, Discrete Automation.

Text/ References Books:

1. **Discrete Math Structure**: *Kolman et al, PHI, 2000*
2. **Science of Programming**: *Gries D. Narosa, 2001*
3. **Intro. To Theory of Automata, Language and Computation**: *Ullman et al, Narosa, 1999*
4. **Theory of Computer Science**: *Misra, PHI, 2002*
5. **Fundamentals of theory of Computation**: *Lewis et al, PHI, 2000*

CS 103 : Programming in C Language

Algorithms and Flow-charts, Programming Languages, Compilation, Linking, Testing, Debugging and Documentation. Introduction to C language; Character set, Variables and Identifiers, Built in data type, Arithmetic operator and expression, Constant and Literals, Relational operator and logical connectivity, Sample assignment statement, Basic Input/ Output statement, Simple C program, Conditional statement and loops. Decision making within a program, Different conditional statement in C, Looping statement in C, Structured programming, Nested loop, Infinite loop. Array and Pointer, Static and

Dynamic memory allocation, Function: Modular programming and Functions, Structure, Union and File system, Graphics in C.

Text/ Reference Books:

1. **Programming in C**: *Reema Thareja, Oxford.*
2. **Programming in ANSI C** : *E. Balagurusamy*
3. **C How to Program**: *Deital & Deital, Pearson Edition, Third Edition, 2001*
4. **Programming in C** : *Denis Ritchie, TMH, Fourth Edition, 2002*

CS 104 : Statistical Techniques

1. **Probability and Probability Distributions**

Various definition of Probability, Additive and Multiplicative theorems, Independent event, Probability distribution, Mathematical expectation, Additive and Multiplicative theorems of expectation, Binomial, Poisson and Normal distributions, Fitting of probability distributions.

2. **Descriptive Statistics**

Measure of central tendency, Dispersion, Measures of dispersion, Moments. Product moment correlation coefficient, Rank correlation, Linear regression, Properties of regression coefficient, Multiple linear regression.

3. **Numerical Methods**

Transcendental and Polynomial Equation: Iterative method, Regula-Falsi method.
Newton-Raphson method,
Roots of Polynomial: Graeffe's and Bairstow methods,
Solution of system of linear algebraic equations: Gauss elimination, Gauss-Jordan method, Data fitting, Method of least squares.

4. **Tests of Significance**

Null and alternative hypotheses, one tail and two tail tests, Two types of error. Large sample tests, Small sample tests: Test of single mean, test of equality of two means, Paired test, Test of goodness of fit, test of independence of attributes, test of variance.

5. **Sampling Techniques and Analysis of Variance**

Sampling and Complete enumeration, Simple random sampling, Stratified random sampling, Proportional and Optimum allocations

ANOVA: One way and two way classifications.

Text / reference Books:

1. G.W. Snedcor, W.G. Cochrass: *"Statistical Methods", 6 Edn, East West Press.*
2. S.C. Gupta: *"Introduction to Mathematical Statistics", 1973, Sultan Chand.*
3. **S.C. Chapra and R.P. Canale:** *"Numerical Methods for Engineers", 2002 TMH.*

CS 105 : Business Data Processing and File Systems

Basic Ideas of the System: System and its Characteristics, Introduction Systems and Technology, Business system, data processing and technology, Business System Context, Environment. Framework for a system in Business, Role of IT in Business Data Processing. System Related Challenges for Business: Improving Business Processes. Benefiting from Trends and Innovations, Maximizing Benefit from Information, Extending Human Skills, Extracting the most from Surrounding Infrastructure, responding to System related Risk, Building and Maintaining Systems, Analyzing System in Business Terms: Need for Framework and Models, Business and BP as System, IS and Business Processes, Analyzing IS and Business Point of View, Strategy for Analyzing, Description and Evaluation of B-Process Architecture, Linking B-Process and Product Performances, Evaluation of B-Process Performances, Evaluation of B-Product Performances, Information Technology in Business, Information and its Determinations. IT and its Functions, IT Trend and Limitations, IT Performance Variable, Computer System Architecture and Trend, Software and Programming, Programming as a B-Process, Major Developments in Programming, Structured Programming, Principles and Techniques of Programming, Program Planning Tools, Testing and

Verification, File System and BDP tools, File and other Structures, File Type, Organization and Operations, File Management, Introduction to Suitable BDP tools.

Text / Reference Books:

1. Information Systems: *A Management Perspective, Alter S. Pearson*

2. Data Processing: *Schaum's Outline Series, Martin M. Lipschuts*

3. Data Processing and Information Technology *C.S. French, BPB publication, 1996*

CS 201 : Computer Architecture

Review of Number Systems; Combinational System, Switching algebra and logic circuits, Karnaugh map, Logic gates, simplification of expressions, implementation using gates, One bit Adder, One bit ALU(add sub, AND, OR), Encoders, multiplexers, Tri-state logic gates, Sequential System, Latches and Flip-Flops, Registers, Counters, Half-adders, Full-adders. Introduction to Computer Design: Design levels, data paths, Registers, Busses. Instruction Set Design: Instructions Formats, Addressing Modes, Assembly Language, RISC Machine, Control Design. Hardwired and Microprogramming. Memory & I/O Memory organization, Cache Memory, Memory Management, I/O, Interrupts, DMA, Pipelining, Parallel Processor, Recent development in computer Architecture. Performance and Cost: Selecting Computers based on Benchmarks.

Text/Reference Books:

1. **Information System** : *A Management Perspective, Alter S. Pearson Education 2000*
2. **Data Processing Schaum's Outline Series**: *Martin M. Lipschuts,TMH 2001*
3. **Data Processing and Information Technology** *C.S. French, BPB Publication, 1996 .*

CS 202 : Data Structure and Program Design

Basic Concepts of Data Representation: Abstract Data Types, Fundamental and Derived Data Types, Representation and Implementation, Different Data Structures, Algorithm Design and Comparison Algorithm. Array and Linked Lists: Representation of arrays and Linked Lists, Comparison of Array and Linked List. Stacks and Queues: Representation of Stack and Queues (Dynamic and Static), Operation on Stack and Queues, Applications of Stack and Queues. Trees: Representation of Trees (Static and Dynamic), Different types of trees, Operations on Trees, Tree Construction, Application of Trees. Searching And Sorting: Different method of Searching, Comparison of Different Searching Method, Different Methods of Sorting, Comparison of Different method of Representation, Operations of Graph, Minimal Spanning tree Algorithm, Shortest Path Algorithm. .

Text/ References Books:

1. **Data Structureand Program Design in C** : *R. Kruse, PHI, 1997*
2. **Data Structure using C and C++**: *Y. Langsam, M.J.Augenstien and A.M. Tanenbaum, Second Edition, 2000*

CS 203 : Object Oriented Programming

Introduce to Java, Java Buzzworld Data type and Variable, Operators, Control Statements, Arrays, Methods, Recursion, Constructors, This and Find keywords, Garbage collection, Object-Oriented Programming. Introduction Objects, Superclass's and Subclasses. Protected Members. Relationship between superclass Object and Subclass Objects. Constructors and finalizes in Subclasses. Encapsulation. Inheritance, Polymorphism, Packages and Interfaces, Example of Packages and Interfaces. Exception Handling and Multithreading, Exception Types, Uncaught Exceptions. Using Try and Catch Nested Try Statement, Throw, Throws, finally. Java Thread Model, Thread Priorities, Synchronization, Main Thread. Advance Java. Overview of JDBC, Applets, Servers, Java Beans, EJB. Different types of Drivers. Jar files. Java Security Tools.

Text/ Reference Books:

1. **The Complete Reference**: *Herbert Schmidt, TMH, Fifth Edition, 2002*

2. **How to program** : *Deitel & Deitel, Pearson Edition, Third Edition, 2001*

3. **Core Java Vol-I & II**: *(Sun Microsystems Press), Hortsman and Cornell, PEA, II And Edition, 2001*

CS 204 : Database Management System

Database: Concept, Comparative view, goals etc. Data Independence, Consistency, Security & Integrity. DBMS models: Hierarchical, Relational and Network; Structured Query Language and Programming Interface; Database design and architecture: DBMS Applications: ORACLE/DB2/Progress/any other; Introduction to Distributed Database, Concurrency control and recovery, Assorted Topics in Database.

Text / reference Books:

1. Fundamental of Database System: *Elemsari & Nava the, Forth Edition, AWP, 2002.*

2. Database Management System: *Ramkrishna, Third Edition, TMH, 2000*

3. **Database System a Practical approach to design implementation and Management:** *Thomas M. Connolly, Person Education Third Edition, 2002*

CS 205 : Object Oriented Analysis and Design

Introduction: Object oriented approach, its features & significance, S/W Complexity & its causes, S/W Crisis & the related issues need to be resolved. Modeling: Object Modeling: Objects & Classes, Links & Associations, Generalization & inheritance, Grouping Constructs, Advanced Objects Modeling Aggregation, abstract classes, multiple inheritance, Meta Data, Candidate Keys and Constraints. Dynamic Modeling: Events & states, operations, nested state diagram, concurrency. Functional Modeling: DFDS, specifying operation, constraints, Analysis and System design: Analysis: Object Modeling, Functional Modeling adding operations, iteration, System design: Subsystem, Concurrency, Allocation to processors and takes, management of data stores, control implementation, Boundary condition, Architectural framework, Object Design, Optimization, Implementation of control, Adjustment of inheritance, Design of associations, documentation, comparison of methodologies, Implementation: Using a programming language, using a database system, Programming styles: Object Oriented Style: Reusability, extensibility, robustness and Programming-in-the-language.

Text / Reference Books:

1. Object Oriented Modeling and Design: *J. Rum Baugh, PHI, 2003*

2. Object Oriented Analysis and Design: *G.Booch,2000*

CS 301 : Operating System

Unit 1

Definition, Components & types of Operating System, Operating System Services, System Calls, System Programs, System Structure, System Design & Implementation, System Generations. I/O Subsystem Overview, I/O H/R. Application I/O Interface, Kernel I/O Subsystem, Linux User & Program Interface.

Unit 2

Process Concepts, Process State & Process Control Block, Process Scheduling. Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real Time Scheduling, Threads Introduction, Multithreading Models, Example System – Process Management in Linux.

Unit 3

The Critical Sections Problem, Semaphores, Classical Problem of Synchronization, Example System-Inter Process, Communication in Linux, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined Approach to Deadlock.

Unit 4

Storage Management, Logical versus Physical Address Space, Swapping, Contiguous Allocating, Paging, Segmentation, Segmentation with Paging, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing, Demand Segmentation, Example System Memory Management in Linux.

Unit 5

Disk Scheduling, Disk Management, Swap Space Management, Disk Reliability, Stable Storage Implementation, File Concepts, Directory Structure, Protection File System in Linux.

Text Books: -

- Operating System Principles by Silberschatz A. and Peterson J.L. Wiley.
- Operating Systems by Dhamdhere, TMH**.**

References: -

- Operating Systems by Deitel, Deitel & Choffnes.
- Operating System by Stalling, Pearson.

CS 302 : Computer Networks

Introduction to Computer Networks: Evolution of Computer Networks, Networks Goals, User & Applications, Network H/R and S/R; Protocol Hierarchies, Design Issues for the Layer, Reference Models, OSI & TCP/IP – Example Networks – Internal.

Fundamentals of Data Transmission: Data Transmission System & Operations, Encoding, Standard Encoding Schemes, Transmission Media, Magnetic Media, Twisted wire-pair, Co-axial Cables, Fibre Optics, Wireless Media-Ratio & Microwave Transmission, Switching Message, Circuit & Packet Switching, Serial & Parallel Transmission – Asynchronous and Synchronous Transmission.

The Data Link Layer: Need for Data Link Control, Service provided by the Data Link Layer. Frame Design Consideration. Flow Control Mechanism. Data Link Error Control, Error Control in Stop-and-Stop Mechanism & Sliding Windows Mechanism, Sequence Numbering. Piggybacking Acknowledgement. MAC layer& It's Different Protocols.

IEEE 802.3 Ethernet: Contention Access, CSMA, CSMA/CD, Physical Topology of Ethernet, Ethernet Repeater, Types of Ethernet.

Bridges & Switches: LAN Bridge, Transparent Bridges, Spanning Tree Algorithm, Ethernet Switches.

The Network layer: Network Layer Design Issue, Purpose of Network Layer, Functions of the Network Layer IP Address, Classful and Classless IP Address, NAT.

Introduction to Internet Protocol: IPv4 & IPv6 Format, ARP, RARP, DHCP, ICMP.

Routing Algorithms: Static Routing, Dynamic Routing, Distance Vector Routing Algorithm, Router Information Protocol, Link State Routing, OSPF Routing Protocol, Border Gateway Protocol, Congestion Control by Chock Packet, QoS, Leaky Bucket and Token Bucket.

Introduction to Application Layer: Difference between TCP & UDP, Port Number, TCP Connection – Three ways Handshaking, Connection Termination – Half Close, Half Open.

Introduction to Application Layer: Introduction of DNS, Email, SMTP, POP3 etc.

Congestion: Congestion Control Algorithms, General Principle of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual Circuit Subnet & Datagram, Techniques for achieving good quality of service (QoS).

Text Book: - Data Communications and Networks, by Forouzan, TMH.
Reference Books:-

- Computer Networks, by Tanenbaun, Pearson Education.
- Data & Computer Communication, by William Stallings, Pearson Education.
- Computer Networking, by Kurose & Ross, Pearson Education.
- Networking, All-in-one Desk Reference, 10 Books in 1 by Doug lowe, Wiley.

CS 303 : Design and Analysis of Algorithm

Introduction: Algorithm, Performance Evaluation of Algorithms, Space & Time Complexity, Nation of Optimality.

Divide & Conquer: Finding the Maximum & Minimum – Quick Sort – Selection – Stassen's Matrix Multiplication, etc.

Greedy Algorithm: Knapsack Problem, (1 Knapsack, Fractional Knapsack), Activity Section Problem. Huffman's Codes, Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm, Dijkstra's Algorithm, etc.

Dynamic Programming: Knapsack Problem DP Solution, Activity Selection Problem DP Solution, All Pairs Shortest Paths, Travelling Salesman Problem.

Randomized Algorithms & Amortized Analysis: Basic ideas of Randomized Algorithms (Las Vegas & Monte Carlo types). Simple examples (Randomized Quick Sort and it's analysis, Min – Cut Algorithm and it's Analysis), Amortized Analysis and its significance (Illustration through examples).

Graph Algorithms: Breadth First Search (BFS), Depth First Search (DFS), Strongly Connected Components, Euler Tour, Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm, Single Source Shortest Path.

Introduction to NP - Completeness: Basic Concepts.
Text Book:

- Introduction to Algorithm, 2e, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, PHI.

Reference Books:

- The Design & Analysis of Computer Algorithms by A.V.Aho, J.E.Hopcroft and J.D.Ullman, Pearson Edu
- Beginning Algorithms by Simen Harris, James Ross, Wiley India.
- Fundamentals of Computer Algorithms by E.Horowitz and S.Sahni, Galgotia.
- Algorithms byRichard Johansonbaugh and Marcus Schaefer, Pearson Algorithm.
- Algorithms – Introduction to Design and Analysis by S.Baase, Pearson Education.
- Algorithms and Compiexity by H.S.Wiif, PHI.

CS 304 : Software Engineering

Software & Software Projects: Concept of Program, Concept of Software Product & Types of Software, Concept of Software based system, Evolution of Software Engineering, Software Process, People & project, System Development Life Cycle (SDLC).

Software Standards & Software Models: SEI – Capability Maturity Model, ISO, OMG, CORBA, IEEE, ANSI, Linear Sequential Model (Water Fall), Evolutionary model, Proto Typing Model, Spiral Model.

Software Project Management: Initial Requirement Analysis, System Modeling, Function Point Analysis, Project Scheduling Gantt Chart, Project Estimation COCOMO, Project Control PERT, Risk Management, Software Team, Life Cycle Model Selection.

Software Requirement Analysis: Functional Requirement, Non Functional Requirements, Requirement Gathering, Fact Finding Methods, Requirement Verification & Validation, Requirement Specification (SRS).

Software Design: Design tools- UML, DFD, VTOC, HIPO, ERD, System Architecture Design, Object Oriented Design using UML tools, Coupling & Cohesion, System structure/modular design, Data Design (ERD), Process Design, I/O Design, User Interface Design, System Interface Design.

Software Coding: Code Review, Code Documentation, Code Optimization.

Software Testing: Concept of Software Testing, Testing Strategies (Black Box & White Box), Testing methods (Coverage based Mutation Test), Test Cases (Test System), Alpha Test & Beta Test.

Software Implementation: Implementation Plan, Deployment Diagram, Implementation Method.

Software Quality Assurances: Software Reliability, Software Quality Standards, Software Quality Attributes.

Software Maintenance: Perfective Maintenance, Corrective Maintenance, Adaptive Maintenance.

Software Change Management: Software Configuration Item, Baseline, Software Change Implementation, Software Change Control, Software Re-Engineering, Clean Room Software Engineering.

Practical: Lab Based UML tools, CASE tools & Project Management tools.

Reference Books:

- Rajib Mall, Fundamentals of Software Engineering, PHI
- Waman Jawadekar, Principle & Project in Software Engineering, TMH.

CS 305 : Compiler Design

Introduction to Compilers: Compilers and Translators, The Phases of a Compiler, Compiler writing tools, The Lexical & Syntactic Structure of a language, Operators, Assignment Statements and Parameter Translation.

Lexical Analysis: The role of the Lexical Analyzer, Specification of Tokens, Lexical Analysis tools.

Syntax Analysis: Role of Parser, CFG, Top-Down parsing, Bottom-up Parser, Operator-Precedence Parsing,, LR Parsers, The Canonical Collection of LR (0) items, Constructing SLR, Canonical LR and LALR Parsing tables, Use of ambiguous grammars in LR Parsing, An Automatic Parser generator, Implementation of LR Parsing tables and Constructing LALR sets of items.

System Directed Translation: Syntax tree, Bottom – Up evolution of S-Attributed definition, L – Attributed definition, Top-Down translation, Bottom – Up evaluation of inherited attributed, Recursive Evaluators.

Type Checking: Static vs. Dynamic Checking, Type Expression, Type Checking, Type Equivalence, Type Conversion.

Symbol Tables: Structure of Symbol Table, Simple Symbol Tables (Linear Table Ordered List, Tree, Hash Table). Scoped Symbol Table (Nested Lexical Scoping, One Table per Scope, One Table for all Scopes).

Intermediate Code: Intermediate Language, Intermediate representation technique, Three-address code, Quadruples and Triples, Translation of assignment statements, Boolean Expressions, Control Flow, Case Assignment, DAG Representation, Code Generation using Dynamic Programming, Code-Generator generators.

Error Detection & Recover: Errors, Lexical Phase errors, Syntactic-Phase Errors, Semantic Errors.

Code Optimization: Need for Optimization, Optimization of Basic blocks, Loops in flow graph, Optimizing Transformation (Compile time evaluation, Common sub-expression elimination, Variable Propagation, Code Movement Optimization, Strength Reduction, Dead Code Optimization, Loop Optimization), Local Optimization, Global Optimization, Computing Global Data Flow Equation, Setting up data flow equation, Setting up data flow equations, Iterative Data flow Analysis.

Text Book:

- Compiler Principles Technique and Tools by Alfered V. Aho, Ravi Sethi, Jeffery D. Ullman, Pearson Education.

Reference Books:

- Modern Compiler Design by Dick Grune, E.Bal, Ceriel J.H. Jacobs and Koen G. Langendoen, Wiley Dreamtech.

CS 401 : Web Technology

Web Programming : Concept of JDBC (Java Database Connectivity), Working with SQL, Stored Procedure, Security in Java, Class Loader, Byte Code Verification, Security Manager and Permission,Digital Signatures, Code Signing, Encryption

Introduction to J2EE: Its advantage, Enterprise Architecture Types, Understanding EJB, its architecture, EJB Roles, Benefits and limitations of Enterprise Beans, Session Beans: Stateful and Stateless Beans, Entity Beans, Beans Managed Persistence, Container Managed Persistance.

Advanced Web Technology in J2EE: Understanding Directory Services and JNDI, Introduction to LDAP, LDAP Operation, Working with LDAP Server, Introduction to Web Containers and Web Applications, Introduction to HTTP Protocol, Web Application Life Cycle.

Creating Web Applications: Understanding Servlet programming, Its life cycle, Servlet Configuration, Understanding Servlet sessions, Understanding of JSP and JSTL, JSP documents, Elements, tag extensions, tag libraries, validation, translation time mechanism, translation-time classes, Understanding JavaServer Pages, Standard Tag Library, tags in JSTL, core tag library, XML tag library, using Internationalization Actions.

Web Application Deployment and Authentication: Enterprise Application Development Process, Deploying Web Application, Understanding CLASSPATH, Securing Web Applications, basic authentication with JAX-RPC example, Client certification Authentication over HTTP/SSL.

Text/Reference Books:

1. **Java Server Programming J2EE 1.4 Edition**: *Black Book (DreamTech Press)*
2. **Core JavaTM Volume II**: *Cay S.Horstmann & Gary Cornell (Pearson)*
3. **J2EE 1.4 Bible:** *McGovern (Wiley India)*

CS 402 : Cryptography and Network Security

Introduction: The OSI Security Architecture, Security attack, Security services, Security Mechanism, A Model for Network Security.

Symmetric Cipher: Classical Encryption Techniques, Symmetric Cipher Model, Block Cipher Principles, DES, Differential and Linear Cryptanalysis, Block Cipher Design Principle, The Euclidean Algorithm, Finite field of Form GP(*p)*, Advance Encryption Standard (AES), AES Cipher, Multiple Encryption and Triple DES, Stream Cipher and RC4, Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random number generation.

Public Key Encryption and Hash function: Fermat's & Euler's Theorems, The Chinese Remainder Theorem, RSA Algorithm, Deffie-Hellman Key Exchange, Elliptic Curve Cryptography, Message Authentication Code, Security of Hash Functions and MAACs, Secure Hash algorithm, Whirlpool, HMAC, CMAC, Digital Signature.

Network Security Applications: Kerberos, X.509 Authentication Service, S/MIME, IP Security Architecture, Encapsulating Security Payload, Secure Socket Layer (SSL), Transport Layer Security, Secure Electronic Transaction.

System Security: Intrusion Detection, Password Management, Virus Countermeasure, Denial of Service Attack, Firewall design Principles, Trusted System

Text/ References Books:

1. **Cryptography and Network Security:** *Principles and practices, 4e, William Stalling, Pearson Education.*
2. **Cryptography and Network Security :** *Behrouz Forouzon , TMH*
3. **Introduction to Cryptography**: *Johannes A. Buchmann,Springer*
4. **Beginning Cryptography with java by David Hook**: *Wiley Dreamtech*
5. **Modern Cryptography Theory & Practices** :*Wenbo Mao, Pearson Education*
6. **Cryptography for Database and Internet Application** : *Nick Galbreath, Wiley Dreamtech*

Network Security: *Private Communication in a Public World*, 2e, by *Charlie Kaufman***,** *Radia Perlman, and Mike Speciner, Pearson Education*

CS 403 : Soft Computing

Essentials of Artificial Neural Networks: Introduction, Artificial Neuron Model, Operations of Artificial Neuron , Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity (Feed forward, feedback, Single and Multi-layer), Neural dynamics (Activation and Synaptic), Learning Strategy(Supervised, Unsupervised and Reinforcement), Learning Rules (error Correction, Hebbian , Competitive, Stochastic), Types of Application (Pattern Classification, Pattern Clustering, Pattern Association/ Memory , Function Approximation , Prediction, Optimization) Support Vector Machines, Boltzmann Machine, Feedback (Recurrent) Networks and Dynamical Systems Matrix Memories, Bidirectional Associative Memory, Hopfield Neural Network, Principal Component Analysis Networks (PCA), Kohonen's Self-Organizing Maps, Linear Vector Quantiation, Independent Component Analysis Networks(ICA)

Fuzzy Logic : Basic concepts, fuzzy set theory, basic operation, fuzzification, defuzzification, neurofuzzy approach, applications.

Evolutionary and Genetic Algorithm: Basic concepts of evolutionary computing, genetic operators, fitness function and selection, genetic programming, other models of evolution and learning.

Rough Set Theory: basic Concept, indiscernibility relation, lower and upper approximation, decision systems based on rough approximation, applications

Text/ Reference Books:

1. Jacek M. Zurada. Introduction to Artificial Neural Systems, jaico Publishers, 1992
2. S. Haykin. Neural Netowrks: A Comprehensive Foundation, Prentice Hall, 1999
3. P. S. Churchland and T. J. Sejnowski. The Computational Brain. MIT Press, 1992
4. A. M. Ibrahim Introduction to Applied Fuzzy Electronics, PHI, 2004
5. Z. Pawlak. Rough sets, Kluwer Academic Publishers, 1991
6. Genetic Algorithm in Search Optimization and Machine Learning, D. E. Goldberg, Pearson Education, 1989
7. An Introduction to Genetic Algorithms, Melanie Mitchell, PHI, 1998

CS 404 : Computer Graphics & Multimedia Applications

Introduction: History, Advantages, Application, I/O Devices Graphic Packages, Languages

Graphics Techniques: Jag Free Images on a Raster CRT Interactive Graphics processor for Digital Logic Simulation System, Interactive techniques for 3D shaded Graphics.

2-D Graphics: Drawing Elementary figures, Polygon Filling, Transformations, Windowing and clipping, Display file segmentation, Interactive graphics: Interactive input techniques, Event handling, Input functions

Graphics Standards A 3D Models: Device Independence AI in Graphics Software, Implementation of Graphics Kernel System (GKS)

Graphical Workstations: Routing output to workstations, Types of GKS, Workstations.

Evaluation of Various 3D Models: Mathematical Preliminaries, Curves and Surfaces , Clipping, Hidden line and surface removal, rendering, ComputerAnimation, 3D Shaded Computer Animation the use of 3D adstract Graphical Types in Computer Graphics and Animation, 3D ReConstruction . A case Study, Real-Time Graphics.

Introduction to Visualization, Tools for visualization, Applications , etc.

Text / reference Books:

1. Computer Graphics C version By *Donald Hearn and M. Pauline Baker, Pearson Education*
2. Mathematical Elements for Computer Graphics *By Roger, TataMcGrawHill Computer Graphics by Hearn, & Baker, PHI*
3. Principles of Interactive Graphics, by *Newman &R. F.Sproull; McGrawHill*
4. Computer Graphics: A Programming Aproach, *by Harrington McGrawHill*
5. Fundamentals of Interactive Computer Graphics, *By Foley and A. Van Dan, Addison Wesley*

CS 405 : Management & Information System

Management System: Types of Management System, Management System Requirement, Anagement level

Management Functions & Business Process: Sale and Order Processing, Finance & Budgeting, Human Resource Management, Production Plan & Control, Marketing

Portfolio & IT Application: Portfolio Management Concept, Portfolio Management Method, Design & Implementation of Portfolio Management, Tools & Techniques.

Enterprise Resource Plan (ERP) : Evolution of Enterprise Information System, Concept of ERP, Supply Chain Management, Customer Relationship Management, ERP Design & Implementation, ERP Tools: SAP, iCUBE

Text / Reference Books:
1. K. C. Laudon & J. P. Laudon, Management Information System (managing the digital firm) PHI
2. Sadagopan S, Management Information System, TMH

CS 501 : Wireless Networks

Introduction : Why wireless, IEEE802.11

802.11 MAC Fundamentals: Challenges for MAC, Access Mode, Contention Based access using DCF, Fragmentation and reassembly, Frame Format, 802.11 graming in detail(DS bits, BSSID, RTS, CTS, Control frame, management frame), Contation based data service, Frame processing and bridging, 802.11 to Ethernet

WEP: WEP cryptographic operations, WEP data processing, Problem with WEP, User Authentication with 802.Ix.

802.11i Robust security networks, TKIP and CCMP: Temporal key integrity protocol, Counter mode with CCB-MAC, Robust security network operation

Management Operations: Association, power conservation, timer synchronization, spectrum management
Contention free service with PCF.

Physical Layer: Physical layer architecture, Radio Link, RF with 802.11, Frequency, GFSK, PLSP, DSSS, HR/DSSS. 802.11a and 802.11j (OFDM Phy), 802.11g(extended rate Phy), 802.11n: MIMO-OFDM

Experiencing on 802.11 on windows OS, Linux

802.11 Access point: Functions of AP, Power over Ethernet, Selecting AP

Security Architecture: Authentication and Access Point, Ensuring secrecy through encryption, selecting security protocols.

Site Planning and Project Management : Network Requirement, PHY layer selection and design, Planning placing AP, Using Antennas to tailor Coverage.
802.11 Network analysis, 802.11 performance running

Text Books:
1. 802.11 Wireless Networks by Mathew S. Gost,SPD

CS 502 : Distributed System

Fundamentals: Definitions, Evolution of distributed computing system, Distributed Computing System Models, Distributed Operating System, Designing a distributed Operating System, Introduction of distributed computing environment.

Message Passing: Introduction Desirable features, Issues in IPC by message passing, synchronization, Buffering, Multi datagram messages, encoding and decoding message data.

Remote Procedure Calls: Introduction, The RPC Model, Transparency of RPC, Implementing RPC mechanism, RPC message server management, parameter – passing and call semantic, Communication protocols for RPC's.

Distributed Shared Memory: Introduction, Architecture of DSM Systems Design and implementation, granularly, structure of shared memory space consistency models, replacement strategy, Threashing

Resource Management: Desirable feature, Task assignment approach, Load-balancing approach, Load sharing approach.

Process Management: Process Migration, Threads

Distributed File Systems: Intakes, Desirable features, File Models, File accessing models, file-sharing semantic, file- caching schemes, file replication Fault tolerance, Automatic Transactions, Design principle

Text Books:
1. George Coulouris, Jean Dollimore and Tim Kindberg "Distributed System Concepts andDesign", third Edition, Pearson Education Asia

Reference Books:
1. 2002 Distributed Computing by Liu, Pearson Education
2. Distributed Computing by Hagit Attiya and Jennifer Weleh, Wiley India
3. Distributed Operating System: Concepts and Design by P. K. Sinha, PHI
4. Distributed Operating System by Tannenbaum, Pearson Education

CS 503 : Data and Web Mining

Introduction to data mining, need for data warehousing and data mining, application potential, keywords and techniques.

Data Warehousing and Online analytical Processing (OLAP): Aggregation operations, models for data warehousing, star schema fact and dimension tables, conceptualisation of data warehouse and multidimensional databases, Relationship between warehouse and mining.

Data Mining And Primitives: Data preprocessing, data integration, data transformation, Definition and specification of a generic data mining task. Description of Data mining query language with examples.

Association Analysis: Different methods for mining association rules in transaction based databases. Illustration of confidence and support. Multidimensional and multilevel association rules. Classification of Association rules. Association rule algorithms – A period and frequent pattern growth.

Classification and Prediction: Different classification algorithms. Use of genie index, decision tree induction, Bayesian classification, neural network technique of back propagation, fuzzy set theory and genetic algorithms

Clustering: Partition based clustering, hierarchical clustering, model based clustering for continuous and Discrete data. Scalabilty of clustering algorithms. Parallel approaches for clustering.

Web Mining: web usage mining, web content mining, web log attributes. Data mining issues in object oriented data bases, spatial data bases and multimedia databases and text data bases.

Text Books:
1. Data Mining Concepts and Techniques by J. Han, M. kamber,Harcourt India
2. Data Mining: introductory and Advanced Topics, by M. Dunham, Pearson pub

3. Data Mining Techniques by A.K. Pujari, Universities Press

CS 504 : Parallel Computing

Introduction to Parallel Computing, Supercomputers and grand challenge problems, Modern Parallel Computers, Data Parallelism, Functional Parallelism, Pipelining and Data Clustering, Minsky Conjecture

Performance Analysis : Introduction, SpeedUp, Super Linear Speedup and Efficiency, Arridahl's Law, Gustafson Law, Gustafson-Barsis's Law, The Karp-Flatt Metric, The Isoefficiency Metric, Isoefiiciency Relation, Cost and Scalability.

Inter-Connection Networks: Tree, Diamond Network, Mesh, Linear Array, Ring, Star, Hypercube, Chordal ring, Cube-connected-cycles,Pefect Shuffle network, ILLIAC IV, Torus, Butterfly, Mesh-of-tree, Pyramid, Generalized Hyperbus, Twisted Cube Folded Hypercube, Incomplete Hypercube, Enhanced incomplete Hypercube, Cross Connected Cube, Bansyan Hypercube

Parallel Computational Model : PRAM, CRCW, CREW EREW, Simulating CRCW on CREW &SREW, PRAM algorithms, P-Complete problems.

Introduction to Parallel Algorithms: PVM,MPI Paradigms, Simple parallel programs in MPI/PVM environments, Parallel algorithms on network, Addition of Matrices, Multiplication of Matrices, Systolic Array

CS 505 : .NET

Introduction : Introduction to .NET Architecture, Features of Visual Studio .NET

VB.NET FUNDAMENTALS : Introduction to .NET Framework – Controls – Menus and Dialog Boxes – Variables and Operators – Decision Structures – Loops and Timers – Debugging – Trapping and Handling Errors.

VB.NET PROGRAMMING : Modules and Procedures – Arrays and Collections – Exploring Text Files and String Processing – Automating Microsoft Office Applications – Deployment of VB.NET Applications.

VB.NET UI DESIGN AND DATABASE APPLICATIONS: Windows Forms – Graphics and Animation – Inheriting Forms and Creating Base Clases – Working with Printers – ADO.NET – Data Grid Control.

VC++ FUNDAMENTALS : Windows Programming Fundamentals – Event Driven Programming – MFC Library Application Framework – App Wizard – Class Wizard – Event Handling – Message Mapping – Device Context – Dialog Data Exchange and Validation (DDX and DDV)

VC++ UI DESIGN AND DATABASE APPLICATIONS: Dialog Based Applications- Windows Common Controls – Using ActiveX Controls – SDI and MDI applications – Document View Architecture – Splitter Windows – Serialization – Reading and Writing Documents – ODBC – MFC Database Classes

TEXT BOOKS

1. Michael Halvorson, " Visual Basic.NET", Prentice Hall Of India, New Delhi, 2002
2. Beginning Visual C# 2005 By Karli Watson, Christian Negal, Wiely India
3. Microsoft Visual C#.NET- STEP by STEP by SHARP & JAGGER Microsoft / PHI

REFERENCE BOOKS:

1. Professional C# 2005 by, Christian Nagel, Bill Evgen, Wiely India
2. The Complete Reference C# 2.0 By Schildt, TMH

CS 506 : Colloquial

Section I: Reading

Select Short Stories: Three short stories from the book , "*Added Values: The Life Stories of Indian Business Leaders",* by PeterChurch; New Delhi

1. NR Narayana Murthy/ Infosys
2. Dr. Anand Deshpande/ Persistent Systems
3. Deepak Puri/ Moser/ Baer India

Section II Phonetics

Phonetic Symbols, identifying vowel and Consonant Sounds, syllable; Intonation

Section III: Language Proficiency

Day-to-day expressions, words often confused; Synonyms & Antonyms; One-word Substitution, syntax, Idiom and Phrases, Direct & indirect, Active and Passive, tenses and Articles.

Section IV: Effective Writing/Business Correspondance:

Composition (Expository/ argumentative/ Descriptive/ Narrative); Summary Writing; Report Writing; Creative Writing; Fax; Email; Taking Notes; Writing & handling Complaints; Abstract; Memo; Minutes; Proposal; Inquiring Letter, Sales Letter, Order Letter.

Section V : Communication Skills/ Effective Presentations

Impromptu Speech; Debate; Group Discussion; Presentations (Seminar, class-room, business and academic)

SectionVI:Preparation for job

Covering Letter; Curriculum Vitae, Job Application; Preparing for Interviews; Soft Skills Training

Text Books:

Church, Peter *The Life Stories of Indian Business Leaders:* Roli Books, New delhi
Hall, Richard h. *Organisations-Structures, Processesand OutComes:* PHI, New Delhi
Raman, M & S Sharma. *Technical communication:* OUP
Guffey. M. E. *Business Communication: Process and Product:* Thomson Learning, New York

References:

1. Balasubramaniam, T.A *Textbook Of English Phonetics for Indian students. Macmillan India, Delhi*
2. Mclearn, Stephen. *Writing Essays and Report: A Student's Guide:* Viva Books, New Delhi
3. Burton, Robert N. *Analysing Sentences: Longman, London*
4. Wekker, H. and Haegeman, L. A *Modern Course in English syntax:* Croom Helm, London