

**COURSE STRUCTURE AND SYLLABUS APPROVED IN THE BOARD OF STUDIES
MEETING ON 19TH MARCH 2018 TO BE EFFECTIVE FROM THE
ACADEMIC YEAR 2018-19
(Accordance to CBSC System)**

First Semester							
Paper Code	Title	Workload Per Week		Marks			No. of Hours/ week/ session
		Theory	Practical	Sessional	University	Total	
13001	Problem Solving and Programming using C	4	-	25	75	100	4
13002	Data Base Management Systems	4	-	25	75	100	4
13003	Computer Organization	4	-	25	75	100	4
13004	Mathematical Foundations for Computer Applications	3	-	25	75	100	3
13005	Accountancy & Financial Management	3	-	25	75	100	3
13001P	Programming in C Laboratory	-	3x2=6	25	50	75	6
13002P	Data Base Management Systems Laboratory	-	3x2=6	25	50	75	6
13003P	Computer Organization Laboratory	-	3x2=6	25	50	75	6
Total						725	36

Second Semester							
Paper Code	Title	Workload Per Week		Marks			No. of Hours/ week/ session
		Theory	Practical	Sessional	University	Total	
23001	Data Structures	4	-	25	75	100	4
23002	Computer Networks	4	-	25	75	100	4
23003	Advanced Data Base Management System	4	-	25	75	100	4
23004	Operating systems	3	-	25	75	100	3
23005	Probability & Statistics	3	-	25	75	100	3
23001P	Data Structures Laboratory		3x2=6	25	50	75	6
23002P	Computer Networks & Operating systems Laboratory		3x2=6	25	50	75	6
23003P	Advanced Data Base Management Systems Laboratory		3x2=6	25	50	75	6
Total						725	36

Third Semester							
Paper Code	Title	Workload Per Week		Marks			No. of Hours/ week/ session
		Theory	Practical	Sessional	University	Total	
33001	Object Oriented Programming through Java	4	-	25	75	100	4
33002	Software Engineering	4	-	25	75	100	4
33003	Network Programming	4	-	25	75	100	4
33004	Optimization Techniques	3	-	25	75	100	3
33005	Artificial Intelligence	3	-	25	75	100	3
33001P	Object Oriented Programming through Java Laboratory		3x2=6	25	50	75	6
33002P	Software Engineering Laboratory		3x2=6	25	50	75	6
33003P	Network Programming Laboratory		3x2=6	25	50	75	6
Total						725	36

Fourth Semester							
Paper Code	Title	Workload Per Week		Marks			No. of Hours/ week/ session
		Theory	Practical	Sessional	University	Total	
43001	Web Technologies	4	-	25	75	100	4
43002	Dot Net Programming	4	-	25	75	100	4
43003	Advanced Java Programming	4	-	25	75	100	4
43004 A/B/C/D	Elective I: A) Formal Language Automata Theory, B) Information Systems, C) Machine Learning, D) Big Data Analytics	3	-	25	75	100	3
43005 A/B/C/D	Elective II: A) Human Computer Interaction B) Management Information System, C) Computer Graphics, D) PHP	3	-	25	75	100	3
43001P	Web Technologies Laboratory	-	3x2=6	25	50	75	6
43002P	Dot Net Programming Laboratory	-	3x2=6	25	50	75	6
43003D	Advanced Java Programming Laboratory	-	3x2=6	25	50	75	6
CBCS-I	Non-Core: Introduction to Computers and MS Office	4	-	25	75	100	4
Total						725	40

Fifth Semester							
Paper Code	Title	Workload Per Week		Marks			No. of Hours/ week/ session
		Theory	Practical	Sessional	University	Total	
53001	Cryptography & Network Security	4	-	25	75	100	4
53002	Cloud Computing	3	-	25	75	100	3
53003	Data Warehousing & Data Mining	4	-	25	75	100	4
53004	Elective III: A) Digital Image Processing, B) wireless & Ad-hoc Networks, C) E-Commerce, D) Grid Computing	3	-	25	75	100	3
53005	Elective IV: A) Enterprise Application Integration, B) Distributed Systems, C) Software Testing, D) Theory of Computation	3	-	25	75	100	3
53001P	Cryptography & Network Security Laboratory	-	3x2=6	25	50	75	6
53002P	Cloud Computing Laboratory	-	3x2=6	25	50	75	6
53001S	Seminar Topics from papers published in UGC referred Journals	-	3x1=3	50	-	50	3
53001D	Mini Project	4	3x1=3	-	100	100	3
CBCS-II	Non Core: Internet and World Wide Web	4	-	25	75	100	4
Total						900	39
Note :1. Every Student must give the Seminar at least 2. Seminar will be conducted only by Internal Staff							

Sixth Semester							
Paper Code	Title	Workload Per Week		Marks			No. of Hours/ week/ session
		Theory	Practical	Sessional	University	Total	
63001S	Seminar Topics from papers published in UGC referred Journals	-	-	50	-	50	10
63001D	Major Project Work	-	-	50	200	250	16
Total						300	26
Note: 1. Every Student must give the Seminar at least 2. Seminar will be conducted only by Internal Staff							

SCHEME OF EXAMINATION AND MAXIMUM MARKS

Semester	No. of Papers	Max. Marks in Each Paper			Total Marks
		Internal	University	Total	
I Semester	Theory -5	25	75	100	725
	Practical-3	25	50	75	
II Semester	Theory -5	25	75	100	725
	Practical-3	25	50	75	
III Semester	Theory -5	25	75	100	725
	Practical-3	25	50	75	
IV Semester	Theory -5	25	75	100	825
	non-core-1	25	75	100	
	Practical-3	25	50	75	
V Semester	Theory -5	25	75	100	900
	Non-Core-1	25	75	100	
	Practical -2	25	50	75	
	Mini Project	-	100	100	
	Seminar-1	50	-	50	
VI Semester	Seminar-II	50	-	50	300
	Project Work	50	200	250	
TOTAL					4200

PROCEDURE TO EVALUATE INTERNAL ASSESSMENT

Paper Category	Theory	Practical	Seminar	Minor Project Work	Major Project Work
Sessional Marks	25	25 Designing of the Program (05) + Program execution (10) + (10) Viva Voce	50 Content Preparation (12) + Communication Skills (12) + Presentation Skills (12) + Attempting Queries (14)	-	50 Project Documentation (20) + Presentation(20) + Viva Voce (10)
University Examination Marks	75	50 Record (10) + Designing of the Program (10) + Program execution (20) + (10) Viva Voce	-	100 Project Documentation (40) + Presentation(40) + Viva Voce (20)	200 Paper Based on Project should be submitted to the National/International Conference and Published in the proceedings OR Paper Based on Project should be Published in National/International Journals (50) + Project Documentation (50) + Presentation (50) + Viva Voce (50)

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13001 Paper-I: Problem Solving and Programming using C

UNIT 1:

Introductory Concepts: Types of Programming Languages, Introduction to C, Desirable program Characteristics

Introduction to C Programming: The C Character Set, Writing First Program of C, Identifiers and Keywords, Data types, Constants, Variables and Arrays, Declarations, Expressions Statements, Symbolic Constants

Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, Conditional Operator, Library Functions.

Data Input and Output: Preliminaries, Single Character Input-The Getchar Function, Single Character Output – The Puchar Function, Enter Input Data – The Scanf Function, More About the Scanf Function, Writing Output Data – The Printf Function, More About the Printf Function, The Gets and Puts Functions

Preparing and Running A Complete C Program: Planning a C Program, Writing a C Program, Error Diagnostics, Debugging Techniques

UNIT 2:

Control Statements: Preliminaries, Branching: The IF-ELSE Statement, Looping: The while statement, More Looping: The do-while Statement, Still More Looping: The for Statement, Nested Control Structures, The Switch Statement, The break Statement, The continue Statement, The comma Statement, The goto Statement.

Functions: A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Passing Arguments to a Function, Recursion

Program Structure: Storage Classes, Automatic Variables, External (Global) Variables, Static Variables.

UNIT 3:

Arrays: Defining an Array, Processing an Array, Passing Arrays to Functions, Multidimensional Arrays, Arrays and Strings.

Pointers: Fundamentals, Pointer Declarations, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers, Passing Functions to Other Functions

UNIT 4:

Structures and Unions: Defining a Structure, Processing a Structure, User-defined Data Types (Typedef), Structure and Pointers, Passing Structures to Functions, Self-referential Structures, Unions.

Data Files: Why Files, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data Files, Concept of Binary Files

TEXT BOOKS:

1. Reema Thareja :Programming in C , Oxford university press
2. R.G. Dromey: *How To Solve It By Computer*. (PHI).
3. M.G. Venkatesh Murthy: *Programming Techniques Through C – A Beginner's Companion*. (Pearson Education)
4. E.Balagurusamy: *Programming in ANSI C*. (Tata McGraw Hill,)

REFERENCE BOOKS:

1. Herbert Schildt: *The Complete Reference, C 4th Edition*. (Tata McGrawHill)
2. Deitel and Deitel " C How to Program ", Addison Wesley
3. Brian W.Kernighan & Dennis Ritchie "C Programming Language", PHI

13002 Paper-II: Data Base Management Systems

UNIT 1:

INTRODUCTION: History of Database Systems-Database Systems Applications-Database Systems vs. File Systems-View of Data- Data Models-Database Languages-Transaction Management- Database Systems Structure- Entity Relationship Model.

UNIT 2:

RELATIONAL DATABASES: SQL-Basic Structure-Set Operations-Complex Queries-Joined Queries-DDL-DML

Embedded SQL-Dynamic SQL-Other SQL Functions-Query by Example-Integrity and Security of searching-Relational Database Design-Normalization.

UNIT 3:

DATA STORAGE, INDEXING QUERY EVALUATION & OPTIMIZATION: Storage & File Structure-Disks-RAID-File Organization-Indexing & Hashing-B+ TREE-B Tree-Static Hashing-Dynamic Hashing-Multiple Key Access

Query Processing-Selection Operation-Sorting-Join Operation-Evaluation of Expressions-Query Optimization.

UNIT 4:

TRANSACTION MANAGEMENT: Transaction Concept-Static Implementation-Concurrency Control-Protocols-Deadlock Handling

Recovery Systems-Recovery with Concurrent Transactions-Shadow Paging-Buffer Management-Case Studies-Oracle-Microsoft SQL Server.

TEXT BOOKS

1. Abraham Silberschatz, Henry F.Korth and S.Sudharssan,"Database System Concepts", 4th Edition, Tata McGraw Hill, 2002.
2. Raghu Ramakrishnan & Johannesgerhrke, "Data Base Management Systems", Mc Graw Hill International Edition, 2000.

13003 Paper-III: Computer Organization

UNIT 1:

Digital Logic Circuits – Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational circuits, Flip-flops, Sequential Circuits, Decoders, Encoders, Registers, shift Registers, Binary Counters, Memory Unit.

UNIT 2:

Register Transfer and Microoperations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit.

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

UNIT 3:

CPU Organization – General Register Organization – Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction set Computer.

UNIT 4:

Memory Organization – Memory Hierarchy, Main Memory – RAM – ROM chips, Memory Address Map, Memory Connection to CPU, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic and Instruction Pipeline, RISC Pipeline, Vector Processing.

TEXT BOOKS:

1. Morris Mano -Computer System Architecture –3rd Edition-Pearson Education .
2. Douglas V.Hall Intel 8086-Programming- McGraw-Hill International studies.

REFERENCE BOOKS:

1. Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.

13004 Paper-IV: Mathematical Foundations for Computer Applications

UNIT-I:

MATRIX ALGEBRA - Matrices - Rank of a matrix - Solving system of equations - Eigenvalues and Eigenvectors - Cayley - Hamilton theorem - Inverse of a matrix.

UNIT-II:

BASIC SET THEORY - Basic definitions - Venn diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion – Partitions - Permutation and combination – Relations - Properties of relations - Matrices of relations - Closure operations on relations - Functions - Injective, subjective and objective functions.

UNIT-III:

MATHEMATICAL LOGIC - Propositions and logical operators - Truth table - Propositions generated by a set - Equivalence and implication - Basic laws - Some more connectives - Functionally complete set of connectives - Normal forms - Proofs in propositional calculus - Predicate calculus.

UNIT-IV:

FORMAL LANGUAGES-Languages and grammars - Phrase structure grammar - Classification of grammars - Pumping lemma for regular languages - Context free languages. FINITE STATE AUTOMATA-Finite state automata - Deterministic finite state automata (DFA) - Non deterministic finite state automata (NFA) - Equivalence of DFA and NFA - Equivalence of NFA and Regular Languages.

TEXT BOOKS:

1. David Makinson, "Sets, Logic and Maths for Computing", Springer Indian Reprint, 2011.
2. Grimaldi, R.P and Ramana, B.V. "Discrete and Combinatorial Mathematics", 5th Edition, Pearson Education, 2006.

REFERENCE BOOKS:

1. Hopcroft J.E and Ullman,J.D, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002.
2. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", Tata McGraw Hill, 4th Edition, 2002.
3. Sengadir, T. "Discrete Mathematics and Combinatorics" Pearson Education, New Delhi, 2009.
4. Trembley, J.P. and Manohar, R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, New Delhi, 2007.
5. Venkataraman, M.K., "Engineering Mathematics", 2nd Edition, Volume-II, National Publishing Company, 1989.

13005 Paper-V: Accountancy & Financial Management

UNIT-I:

Accounting Definition, Branches of Accounting- Financial Accounting, Cost Accounting and Managerial Accounting; Significance of Accounting in Business Systems; Financial Accounting Process-Journalizing, Ledger Posting, Balancing of Ledger Accounts, Methods of Depreciation, Preparation of Trial Balance, Income Statement and Balance Sheet.

UNIT-II:

Ratio Analysis – Types of Ratios and their Usefulness; Preparation and Interpretation of Fund Flow and Cash Flow Statements; Budgetary Control – Nature and Scope.

UNIT-III:

Marginal Costing- Nature, Scope and Importance , BEP Analysis and its uses and Limitations, Managerial uses of Marginal Costing. Standard Costing- Nature and Scope.

UNIT-IV:

Financial Management Functions, Capital Budgeting Techniques-Traditional and DCF. Computer based operational, Tactical and Strategic Accounting and Financial Information Systems With Tally Package.

TEXT BOOKS:

1. Jain and Narang, —Accountancyll Vol 1, Kalyani Publishers, 1983.
2. Jain and Narang, — Cost Accountingll, Kalyani Publishers.
3. R.K.Sharma and Shashi K Gupta, —Management Accountingll, Kalyani Publishers.

PRACTICALS

13001P: Programming in C Laboratory

Do the following Assignments in C:

1. Write a program in C to demonstrate decision control structures.
2. Write a program in C to demonstrate loop control structures.
3. Write a program in C to demonstrate case control structure.
4. Write a program in C to demonstrate functions.
5. Write a program in C to demonstrate pointers concept.
6. Write a program in C to demonstrate arrays concept.
7. Write a program in C by using standard library functions to demonstrate string concept.
8. Write a program in C to demonstrate structures concept.
9. Write a program in C to demonstrate usage of files.
10. Write a program in C to perform matrix operations.
11. Write a program in C to perform operations on single linked lists.
12. Write a program in C to perform sorting using selection sort method.
13. Write a program in C to perform sorting using bubble sort method.
14. Write a program in C to perform linear search operation.
15. Write a program in C to perform binary search operation.

13002P: DATABASE MANAGEMENT SYSTEMS LABORATORY

1. Programs in SQL covering all the SQL Queries.
2.
 - a) Write a program in PL/SQL to determine Statistical functions.
 - b) Write a program in PL/SQL to demonstrate functions.
 - c) Write a program in PL/SQL to demonstrate cursors.
 - d) Write a program in PL/SQL to demonstrate parameterized cursors.
 - e) Write a program in PL/SQL to demonstrate procedures.
 - f) Write a program in PL/SQL to demonstrate packages.
 - g) Write a program in PL/SQL to demonstrate overloading packages.
 - h) Write a program in PL/SQL to demonstrate exceptions.
 - i) Write a program in PL/SQL to demonstrate triggers.

13003P: COMPUTER ORGANIZATION LABORATORY

I. CYCLE : Digital Logic Design Experiments :

1. TTL Characteristics and TTL IC Gates
2. Multiplexers & Decoders
3. Flip-Flops
4. Counters
5. Shift Registers
6. Binary Adders & Subtractors
7. A L U

II . CYCLE: 8085 Assembly Language Programming :

1. 8085 Assembly Language Programming according to theory course microprocessors-I using the following trainers :

Keyboard Monitor o f 8085 μ P Trainer.

Serial Monitor of 8085 μ P Trainer with Terminal

8085 Line Assembler of 8085 μ P Trainer with PC as Terminal

8085 Cross Assembler using In-Circuit Emulator (ICE) with 8085 μ P Trainer and PC as Terminal

Graded Problems are to be used according to the syllabus of COMPUTER ORGANIZATION

2. PENTIUM CLASS PC ARCHITECTURE FAMILIARIZATION HARDWARE & SOFTWARE PARTS DEMONSTRATION

23001 Paper-I: Data Structures

UNIT 1:

Introduction: Primitive and Composite data Types, Abstract Data Type, Data Structure, Storage Structure, File Structure, Complexity of an algorithm, Big O Notation. Arrays; Sparse matrix representation and operations. Linked lists: Single double, Circular lists and Operations.

UNIT 2:

Stacks: Representation, Operations, Array and Linked List Implementation, Applications.

Queues: Representation, Operations, Array and Linked list Implementation of single, multiple, priority, dqueue and circular queues, Applications.

UNIT 3:

Trees: Definitions and concepts, Storage representation and manipulation of general trees, Binary trees, Conversion of general tree to binary tree, AVL tree, Tries, B-Trees, Tree traversing techniques

File Organization: Sequential file organization; ISAM, Direct Files, Inverted Lists, Multi lists.

Graphs: Representation, Warshall and Minimal algorithm, Traversal and other operations, Topological sorting; Minimum Spanning tree;

UNIT 4:

Hashing: Access table handling, choosing a hash function, Collision resolution methods, Analysis of hashing.

Internal Sorting Techniques: Selection sort, Bubble sort, Merge sort, Quick sort, heap sort and Radix sort.

External Sorting Techniques: Run lists, Tape sorting, sorting on disks, generating extended run lists.

Searching Techniques: Linear and Binary search.

TEXT BOOKS:

1. J.P. Trembly and P.G. Sorensen, —An Introduction to Data Structures with Applications, Tata McGraw Hill, Second edition.

Reference Books:

1. E. Horowitz and S. Sahani, —Fundamentals of Data Structures, Galgotia Book Source, 1996.
2. Sartaj Sahni, —Data Structures, Algorithms, and Applications in C++II, Tata McGraw-Hill International Editions, 1999

23002 Paper-II: Computer Networks

UNIT 1:

Introduction, Uses of Computer Networks, Network Hardware, network software, Reference Models, Example Networks, Example Data Communication Services.

Physical Layer: Transmission media, Guided media, unguided media, Wireless transmission, Telephone system, Narrowband ISDN, Broadband ISDN and ATM, Communication Satellites.

UNIT 2:

Data Link Layer: Data Link Layer Design Issues, Error Detection and Correction, Elementary data link protocols – An unrestricted Simplex protocols, A simplex Stop and Wait Protocol, Sliding Window Protocol – one bit sliding window protocol, Go back-N ARQ, Selective repeat protocol, Media Access Sub Layer: Static Channel Allocation, Dynamic Channel allocation, Aloha, , IEEE Standard 802.4 token bus, IEEE Standard 802.5 token ring. Comparison 802.4 and 802.5.

UNIT 3:

Network Layer: Network layer design issues, Routing algorithms – classification of routing algorithms, routing tables, Shortest path routing, flooding, Hierarchical routing, Distance Vector routing, Link state routing, Broadcast routing, Multicast routing.

Congestion control algorithms, open loop control, closed loop control, Internetworking design principles, Types of Internetworking, IP Protocol, IPV4 addressing, subnet addressing.

UNIT 4:

Transport layer: The Transport Service, Elements of Transport Protocols, Internet Transport Protocols(TCP and UDP).

Application Layer: Network Security, Secret key algorithms DES, Domain Name System, Electronic Mail, the World Wide Web.

TEXT BOOKS:

1. Computer Networks -- Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI

Reference Books:

1. Computer Communications and Networking Technologies –Michael A.Gallo, William M .Hancock - Thomson Publication
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH

23003 Paper-III: Advanced Data Base Management Systems

UNIT-I:

The Entity – Relationship Model-Constraints-Entity-Relationship Diagrams, Design Issue-Weak Entity Sets-Database Design for Banking Enterprise- The Unified a Modeling Temporal Data- User Interfaces and Tools- Triggers-Authorization in SQL.

UNIT-II:

OBJECT- DATABASES AND XML: Object-based databases – Complex data types, structured types and inheritance in SQL, table inheritance, array and multiset types in SQL, object identity and reference types in SQL, implementing O-R features, Persistent programming languages, OO vs OR. XML – Structure of XML, Document Schema, Querying and Transformation, API in XML, XML applications.

UNIT-III:

Query Processing: Measures of Query Cost-Selection Operation-Sorting-Joint Operation-Evaluation of Expressions-Query Optimization: Transformation of Relational Expressions-Estimating Statistics of Expression Results-Choice of Evaluation Plans.

UNIT-IV:

Transactions: Transaction concept, Transaction State-Implementation of Atomicity and Durability-Concurrent Executions – Serializability - Recoverability - Implementation of Isolation - Testing for Serializability, Concurrency Control: Lock Based Protocols- Timestamp-Based Protocols-Validation-Based Protocols-Multiple Granularity- Multiversion Schemes-Deadlock handling-Insert and Delete Operations-Weak Levels of Consistency-Concurrency in Index Structures,

Recovery System: Failure Classification-Storage Structure-Recovery and Atomicity-Log-Based Recovery- Recovery with Concurrent Transactions-Buffer Management-Failure with lose of Nonvolatile Storage-Advanced Recovery Techniques-Remote Backup Systems.

TEXT BOOKS:

1. Silberschatz A. Korth H F, and Sudarsan S, *Database System Concepts*, 5th edition, McGraw-Hill 2002. (Chapters 1to 4, 6 to 10 and 13 to 17)

REFERENCE BOOKS:

1. Date C J, *An Introduciton to Database Systems*, 7th edition, Pearson Educaiton, 2000.

2. Elmasri R, and Navathe S B, *Fundamentals of Database Systems*, 4th edition, Pearson Education, 2004.

3. Ramakrishnan R, and Gehrke J, *Database Management Systems*, 2nd edition, McGraw-Hill, 2000.

4. Mannino M V, *Database Application Development and Design*, McGraw-Hill, 2001.

23004 Paper-IV: Operating systems

UNIT 1:

Operating System-Basic elements of computers, instruction execution, operating system objectives and functions. Evaluation of operating systems, System components, Operating-System services, System Calls, Virtual Machines.

Process and Threads- Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication

UNIT 2:

Concurrency; principles of concurrency mutual exclusion, The Critical Section Problem, Critical Regions, semaphores, monitors, message passing, Readers/Writers Problems

Deadlocks - System Model, Dead locks Characterization, Methods for Handling Dead locks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

UNIT 3:

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.

UNIT 4:

I/O management and Disk Scheduling; I/O Devices, Organization of I/O Functions, I/O Buffering, Disk Scheduling, Disk Cache

File System Interface and Implementation -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance.

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI.

REFERENCE BOOKS:

3. Operating System A Design Approach-Crowley, TMH.
4. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI
5. Operating Systems, Dhamdhare, TMH

23005 Paper-V: Probability & Statistics

UNIT 1:

Probability distributions:

Concept of a random variable – discrete and continuous random variables, probability mass function and density function. Probability distribution and its properties. Concept of mathematical expectation and variance of a random variable. Theoretical distributions. Binomial, Poisson, Normal – Properties and applications.

UNIT 2:

Testing of Hypotheses:

Population and sample, point and interval estimates of population parameters from sample data, Confidence interval of mean from normal distribution. Statistical hypothesis, null and alternative hypothesis, level of significance, test statistic and p-value of a test. Tests based on normal distribution – the Z test for means and proportion. Small sample tests – Student's t-test for one sample and two sample problems and paired t-test, F-test for comparing two variances, Chi-square test and its applications – methods and problems.

UNIT 3:

Regression and Correlation:

Simple linear regression model, scatter diagram, fitting a line using the method of least squares, estimation of the regression coefficient, mean and variance of the estimators, measure of the quality of fit using coefficient of determination. . Multiple linear regression and its applications.

Correlation coefficient – positive and negative correlations and Pearson's formula. Relation between correlation and regression coefficients. Simple applications and problems.

UNIT 4:

Design of experiments:

Basic designs for conducting experiments – the Completely Randomized Design (CRD), Randomized Block Design (RBD) and the Latin Square Design (LSD) and their applications. Analysis using one-way and two-way ANOVA.

Statistical Quality Control:

Causes of variation, random and assignable causes of variation. The principle of Shewart control chart, charts for attribute and variable quality characteristics. Construction and operation of p-chart, c-chart, X-Bar and R-chart.

TEXT BOOKS:

1. Walpole r E, Myers R H, Myers S L, and Ye K, probability and Statistics for engineers and scientists, 7th edition, Pearson Education, 2002.
2. Johnson R A, Probability and Statistics for Engineers, 6th edition, PHI, 2000.

REFERENCE BOOKS

1. Hogg R V, and Craig A L, Introduction to Mathematical statistics, American Pub.
2. Blake I e, An Introduction to Applied Probability, John Wiley.
3. Lipschutz S, Probability (Schaum Series) McGraw-Hill.
4. Montgomery D C, Introduction to Statistical Quality Control, Wiley.
5. Montgomery D C, Design and Analysis of Experiments, 5th edition, Wiley.

PRACTICALS

23001P: Data Structures Laboratory

The following assignments shall be implement in C

1. Create a singly linked list and perform operations on it.
2. Create a doubly linked list and perform operations on it.
3. Create a stack and perform operations on it.
4. Create a queue and perform operations on it.
5. At least three classical applications of linked lists.
6. At least three classical applications of stacks.
7. At least three classical applications of queues.
8. Create a binary tree and traverse it in in-order, pre-order and post-order using iterative and recursive methods.
9. Create a binary search tree and perform search, insert and delete operations.
10. Create an AVL tree and perform search, insert and delete operations.
11. Create a priority queue and perform insert and delete operations.
12. Implement graph traversals: BFS and DFS
13. Implement Dijkstra's algorithm.
14. Implement Prim's algorithm.
15. Implement Kruskal algorithm.
16. Represent sparse matrices using multi-linked structures and perform addition, subtraction and multiplication operations.
17. Implement quick, heap, radix and address calculation sorting techniques.

23002P: Computer Networks & Operating Systems Laboratory

Computer Networks Lab:

1. Implement The Shortest path routing algorithm.
2. Implement Distance Vector Routing algorithm
3. Implement the Link state routing algorithm.
4. Implement data encryption and decryption shifting algorithm.

Operating System Lab:

1. Demonstrate creation of Threads and Synchronization in C++
2. Implement Banker's Algorithm for deadlock prevention in C++
3. Design and develop C++ program for FCFS & SJF CPU Scheduling compare for same set of jobs.

Process	Burst Time
P1	10
P2	1
P3	2
P4	1
P5	5

4. Design and develop C++ program for Round Robin Scheduling for a given set of jobs (above table) and Show average waiting time, turnaround time.
5. Demonstrate producers and Consumers problem for Inter process communication in C++.
6. Design and develop C++ program for FIFO page replacement algorithm for following set of page references 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 and show no. of page faults.
7. Design and develop C++ program for LRU page replacement algorithm for following set of page references 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 and show of no. of page faults and belady's anomaly if it occurs.
8. Design and develop C++ program for Optimal page replacement algorithm for following set of page references 1,2,3,4,2,1,5,6,2,1,2,3,5,5,3,4,1 and show of no. of page faults and belady's anomaly if it occurs.

23003P: Advanced Data Base Management Systems Laboratory

1. Write a PL/SQL Block for demonstrating the GOTO statement
2. Write the PL/SQL Block for generating the prime numbers & also counting the no. of prime number using procedure concept.
3. Write a PL/SQL Block for calculating area & Perimeter of a rectangle.
4. Write a PL/SQL Block to find out Factorial of a given number using functions.
5. Write a PL/SQL program for illustrating the stored procedures
6. Write a PL/SQL Block for illustrating implicit cursors.
7. Write a PL/SQL Block for demonstrating explicit cursors.
8. Write a Trigger on insert before operation with suitable relation.
9. Write a Trigger on update operation before with suitable relation
10. Write a PL/SQL Block for illustrating the pre-defined exceptions.
11. Write a PL/SQL Block for demonstrating user defined exceptions.
12. write a PL/SQL block for illustrating the creation and usage of a package specification & package body.

33001 Paper-I: Object Oriented Programming Through JAVA

UNIT 1:

Java Basics - History of Java, Java buzzwords, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow-block scope, conditional statements, loops, break and continue statements, simple java program, arrays, input and output, formatting output, Review of OOP concepts, encapsulation, inheritance, polymorphism, classes, objects, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, building strings, exploring string class, Enumerations, autoboxing and unboxing, Generics.

UNIT 2:

Inheritance – Inheritance concept, benefits of inheritance, Super classes and Sub classes, Member access rules, Inheritance hierarchies, super uses, preventing inheritance: final classes and methods, casting, polymorphism- dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

Interfaces – Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.

Packages-Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

UNIT 3:

Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes, Guide lines for proper use of exceptions.

Multithreading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, interthread communication, thread groups, daemon threads.

UNIT 4:

GUI Programming with Java - The AWT class hierarchy, Introduction to Swing, Swing vs. AWT,MVC architecture, Hierarchy for Swing components, Containers – Top-level containers – JFrame, JApplet, JWindow, JDialog, Light weight containers – JPanel, A simple swing application, Overview of several swing components- JButton, JToggleButton, JCheckBox, JRadioButton, JLabel, JTextField, JTextArea, JList, JComboBox, JMenu, Java's Graphics capabilities – Introduction, Graphics contexts and Graphics objects, color control, Font control, Drawing lines, rectangles and ovals, Drawing arcs, Layout management - Layout manager types – border, grid, flow, box.

Event Handling - Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Semantic and Low-level events, Examples: handling a button click, handling mouse and keyboard events, Adapter classes.

TEXT BOOKS:

1. Java: the complete reference, 7th edition, Herbert Schildt, TMH.
2. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education / Java: How to Program P.J.Deitel and H.M.Deitel, 8th edition, PHI.

REFERENCE BOOKS:

1. Core Java, Volume 1-Fundamentals, eighth edition, Cay S.Horstmann and Gary Cornell, Pearson education.
2. Java Programming, D.S.Malik, Cengage Learning.
3. Object Oriented Programming with Java, B.Eswara Reddy, T.V.Suresh Kumar, P.Raghavan, Pearson-Sanguine.
4. An introduction to Java programming and object oriented application development, R.A. Johnson- Cengage Learning.
5. Advanced Programming in Java2, K.Somasundaram, Jaico Publishing House.
6. Starting out with Java, T.Gaddis, dreamtech India Pvt. Ltd.
7. Object Oriented Programming with Java, R.Buyya, S.T.Selvi, X.Chu, TMH.
8. Object Oriented Programming through Java, P.Radha Krishna, Universities Press.
9. An introduction to programming and OO design using Java, J.Nino, F.A.Hosch, John Wiley & Sons.
10. Java and Object Orientation, an introduction, John Hunt, second edition, Springer.
11. Maurach's Beginning Java2,D.Lowe, J.Murach, A. Steelman, SPD.
12. Programming with Java, M.P.Bhave, S.A.Patekar, Pearson Education

33002 Paper-II: Software Engineering

UNIT 1:

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process: A layered technology, A process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

Process models: The waterfall model, Incremental model, Rad model, Spiral model, Evolutionary process models, The Unified process.

An Agile View of process: Agility, Agile process models- Scrum process model, Extreme programming (XP).

UNIT2:

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models: Context Models, Behavioral models, Data models, Object models, structured methods.

UNIT 3:

Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Metrics for Process and Products : Software Measurement, Metrics for software quality.

UNIT 4:

Risk Management: Reactive vs Proactive risks strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition. McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.
3. Designing Flexible Object Oriented systems with UML-Charles Ritcher
4. Object Oriented Analysis & Design, Sat/inger. Jackson, Burd Thomson

REFERENCE BOOKS:

1. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
3. Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

33003 Paper-III: Network Programming

UNIT-I:

Unix Utilities-Introduction to Unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, unmask, ulimit, ps, who, w, finger, arp, ftp, telnet, rlogin, text processing utilities and backup utilities, detailed commands to be covered are cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, tar, cpio.

Problem solving approaches in Unix: Using single commands, using compound Commands, shell scripts, C programs, building own command library of programs. Working with the Bourne shell: what is a shell, shell responsibilities, pipes and input Redirection, output redirection, here documents, the shell as a programming language, shell meta characters, shell variables, shell commands, the environment, control structures, shell script examples.

UNIT-II:

Unix Files: Unix file structure, directories, files and devices, System calls, library functions, low level file access, usage of open, creat, read, write, close, lseek, stat, fstat, octl, umask, dup, dup2. the standard i/o (fopen, fclose, fflush, fseek, fgetc, getc, getchar, fputc, putc, putchar, fgets, gets), formatted I/O, stream errors, streams and file descriptors, file and directory maintenance (chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd), Directory handling system calls (opendir, readdir, closedir, rewinddir, seekdir, telldir)

UNIT-III:

Unix Process, Threads and Signals: What is process, process structure, starting new process, waiting for a process, zombie process, process control, process identifiers, system call interface for process management-fork, vfork, exit, wait, waitpid, exec, system,

Threads-Thread creation, waiting for a thread to terminate, thread synchronization, condition variables, canceling a thread, threads vs. processes, Signals- Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions.

UNIT-IV:

Interprocess Communication Overview: Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, file and record locking, other Unix locking techniques, pipes, FIFOs, streams and messages, namespaces, introduction to three types of IPC (system-V)-message queues, semaphores and shared memory.

Message Queues-Unix system-V messages, Unix kernel support for messages, Unix APIs for messages, client/server example.

Semaphores-Unix system-V semaphores, Unix kernel support for semaphores, Unix APIs for semaphores, file locking with semaphores.

TEXT BOOKS:

1. Unix Network Programming, W.R.Stevens Pearson/PHI.
2. Unix Concepts and Applications, 3rd Edition, Sumitabha Das, TMH.
3. Advanced Unix Programming, 2nd Edition, M.J.Rochkind, Pearson Education.

REFERENCE BOOKS:

1. Unix system programming using C++, T.Chan, PHI.
2. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
3. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education
4. Unix and Shell programming, B.A.Forouzan and R.F.Gilberg, Thomson

33004 Paper-IV: Optimization Techniques

UNIT - I

Linear Programming Problem: Introduction – Mathematical Formulation of the Problem Linear Programming Problem Graphical Solution: Some Exceptional Cases – General Linear Programming Problem – Canonical and Standard Forms of LPP. Simplex Method: The Computational Procedure of Simplex Method, Big-M Method, Two-Phase method, and some simple problems.

Duality in Linear Programming: Formulating a Dual Problem – Primal – Dual Pair in Matrix Form – Duality and Simplex Method – Dual Simplex Method – Degeneracy and Some related problems

UNIT - II

Transportation Problem: Introduction – General Transportation Problem – The Transportation Table – Duality in Transportation Problem – Loops in Transportation Tables – LP Formulation of the Transportation Problem –Solution of a Transportation Problem – Finding an Initial Basic Feasible Solution – Testing for Optimality – Degeneracy in Transportation Problem – Transportation Algorithm (MODI Method), Unbalanced Transportation Problem.

Assignment Problem: Introduction – Mathematical Formulation of the Problem – The Assignment Method – Special Cases in Assignment Problems – The Traveling Salesman Problem

UNIT - III

Sequencing Problem: Introduction – Problem of Sequencing – Basic Terms Used in Sequencing – Processing n Jobs through Two Machines - Processing n Jobs through K Machines - Processing 2 Jobs through K Machines

Games and Strategies: Introduction – Two – Person Zero – Sum Games – Some Basic Terms – The Maximin – MiniMax Principle – Games without Saddle Points – Mixed Strategies – Graphic Solution of $2 \times n$ and $m \times 2$ Games – Dominance Property – Arithmetic Method For $n \times n$ Games – General Solution of $m \times n$ Rectangular Games

UNIT - IV

Network Scheduling by PERT / CPM: Introduction – Network and Basic Components – Rules of Network Construction – Critical Path Method, PERT, Probability Considerations in PERT, PERT Calculations – Distinction between PERT and CPM, Some Samples Problems

TEXT BOOK:

1. Operations Research by – Kranti Swarup, Gupta, Manmohan – Sultan Chand & Sons, New Delhi, 2003 (11th Edition)

REFERENCE BOOKS:

1. Hiller F.S. & Liberman G.J.: Introduction to Operations Research 2nd Edn.: - Holand Day Inc. London, 1974
2. Tara H.A.: Operation Research, 3rd Edn.- McMillan Publishing Company, 1982
3. Beightler C.S. & Phillips D.T.: Foundations of Optimization,- Prentice Hall, 1979
4. McMillan Claude Jr.: Mathematical Programming, 2nd Edn.- Wiley Series, 1979
5. Gillett B.G.: Introduction to Operation Research - A Computer oriented Algorithmic approach- McGraw Hill Book Comp., 1976
6. N.S. Kambo: Mathematical Programming Techniques

33005 Paper-V: Artificial intelligence

UNIT 1:

Problems and Search: What is Artificial Intelligence?, The AI Problems, The Underlying Assumption, What is an AI Technique, The Level of the Model, Criteria for Success.

UNIT 2:

Problems, Problem Spaces, and Search: Defining the Problem as a State Space Search, Production systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.

Heuristic Search Techniques: Generate and Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means Ends Analysis.

UNIT 3:

Knowledge Representation:- Knowledge Representation Issues, Representations and Mappings, Approaches to knowledge Representation, Issues in Knowledge Representation.

UNIT 4:

Using Predicate Logic:- Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction.

Representing Knowledge Using Rules:- Procedural Versus Declarative knowledge, Logic Programming, Forward versus Back ward Reasoning, Matching, Control Knowledge.

TEXT BOOK:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Tata McGrawHill

REFERENCE:

1. Artificial Intelligence – A modern approach, Stuart Russel, Peter Norwig, Pearson Education.

PRACTICALS

33001P: Object Oriented Programming Through JAVA Laboratory

1. Programs to illustrate constructors.
2. Programs to illustrate Overloading & Overriding methods in JAVA.
3. Programs Illustrate the Implementation of Various forms of Inheritance. (Ex. Single, Hierarchical, Multilevel inheritance...)
4. Program which illustrates the implementation of multiple Inheritance using interfaces in JAVA.
5. Program to illustrate the implementation of abstract class.
6. Programs to illustrate Exception handling
7. Programs to create packages in Java.
8. Program to Create Multiple Threads in Java.
9. Program to Implement Producer/Consumer problem using synchronization.
10. Program to Write Applets to draw the various polygons.
11. Create and Manipulate Labels, Lists, Text Fields, Text Areas & Panels
12. Handling Mouse Events & Keyboard Events.
13. Using Layout Managers.
14. Create & Manipulate the Following Text Areas, Canvas, Scroll bars, Frames, Menus, Dialog Boxes.
15. Programs, which illustrate the manipulation of strings.
 - a. Ex. 1. Sorting an array of Strings.
 2. Frequency count of words & Characters in a text.
16. Programs, which illustrate the use of Streams.
17. Java Program that reads on file name from the user and displays the contents of file.
18. Write an applet that displays a simple message.
19. Write an applet that computes the payment of a loan based on the amount of the loan, the interest rate and the number of months. It takes one parameter from the browser: Monthly rate; if true, the interest rate is per month; Otherwise the interest rate is annual.
20. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the + - X % operations. Add a text field to display the result.
21. Write a Java program for handling mouse events.
22. Write a Java program for creating multiple threads
23. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
24. Write a Java program that lets users create Pie charts. Design your own user interface (with AWT)
25. Write a Java program that allows the user to draw lines, rectangles and ovals.
26. Write a Java program that illustrates how run time polymorphism is achieved.

33002P: Software Engineering Laboratory

Create UML diagrams for the following:

1. ATM Application
2. Library Management System
3. Online Book Shop
4. Railway Reservation System
5. Banking System
6. Document Editor
7. Abstract Factory design pattern
8. Builder design pattern
9. Facade design pattern
10. Bridge design pattern
11. Decorator design pattern
12. Chain of responsibility

33003P: Network Programming Laboratory

1. Write a Shell Script program sum of the digits of the given number.
2. Write a Shell Script program for reverse of the given number.
3. Write a Shell Script program to find the factorial of a given number.
4. Write a Shell Script program to print multiplication table.
5. Write a Shell Script program to find the Fibonacci series.
6. Write a Shell Script program to find whether a person is eligible for vote or not.
7. Write a Shell Script program to find the biggest of three numbers.
8. Write a Shell Script program to read a word if it is start with capital vowel or small vowel or end with digits.
9. Write a Shell Script program to menu driver which has the following options.
10. Write a Shell Script program to perform an Arithmetic operation.
11. Write a Shell Script program to perform addition of n specified numbers.
12. Write a Shell Script program for text command.
13. Write a Shell Script program to search a string in a file.
14. Write a Shell Script program to display the file contents (or) Write a file on execute based on user choice.
15. Write a Shell Script program to print the file name if it has read and write and execute permissions.
16. Write a Shell Script program to display all words which are entered as command line arguments.
17. Write a Shell Script program to print all positional parameters passed to programs and number of arguments.
18. Write a Shell Script program which takes two file names as arguments, if their contents are same then delete the second file.
19. Write a Shell Script program to check read permissions to the file if does not have add the read permission.
20. Write a Shell Script program the files are copied from one file to another file using if then fi.
21. Write a Shell Script program to display all sub-directories in the current directories.
22. Write a Shell Script program to check how many users are working on the same system.
23. Write a Shell Script program to rename the *.cpp file to *.c files.
24. Write a Shell Script program for file test.

43001 Paper-I: Web Technologies

UNIT 1:

Introduction to XHTML : Introduction – First XHTML –XHTML Validation service – Headers – Linking– Images – Unordered Lists – Nested and Ordered Lists – Basic XHTML Tags – Intermediate XHTML Tables and Formatting – XHTML Forms – Internal Linking – Creating and Using Image maps – meta Elements – frameset element – Nested framesets.

Cascading Style Sheets – Introduction –Inline Styles – Embedded Style Sheets – Conflicting Styles– Linking External Style Sheets – Positioning Elements – Backgrounds – Element dimensions – Text flow and the Box Model – User Style Sheets

UNIT 2:

Java Script: Introduction to Scripting: Introduction – A Sample Program: Printing a Line of Text in a Web Page – Obtaining user with prompt Dialogs

Functions: Introduction – Program Modules in JavaScript – Programmer-Defined Functions – Function Definitions – Random Number Generation – Example – Scope Rules – JavaScript Global Functions – Recursion vs. Iteration

Arrays: Declaring and Allocating Arrays – Examples Using Arrays – References and Reference Parameters – Passing Arrays to Functions – Sorting Arrays – Searching Arrays : Linear Search and Binary Search – Multidimensional Arrays.

Objects: Introduction – Thinking About Objects – Math Object – String Object – Date Object – Boolean, Number, document, window Object

UNIT 3:

Dynamic HTML – Object Model and Collections: Introduction – Object Referencing – Collections all and Children – Dynamic Styles – Dynamic Positioning – Using the frames Collection – navigator Object Event Model – Event Onclick – Event onload – Error Handling with onerror – Tracking the Mouse with Event onmousemove – Rollovers with onmouseover and onmouseout – Form Processing with onfocus and onblur – More Form Processing with onsubmit and onreset – Event Bubbling – More DHTML Events.

Filters and Transitions: Flip filters: flipv and fliph – Transparency with the chroma Filter – Creating Image masks – Miscellaneous Image filters: invert, gray and xray – Adding shadows to Text – Creating Gradients with alpha – Making Text glow – Creating Motion with blur – Using the wave Filter – Advanced Filters: dropshadow and light – blendTrans Transitions – revealTrans Transitions

UNIT 4:

XML (Extensible Markup Language): Introduction – Structuring Data – XML Namespaces Document Type Definitions (DTDs) and schemas– XML vocabularies- Document Object Model – DOM methods – Simple API for XML - Extensible Style Language(XSL) – Simple Object Access Protocol(SOAP)

Web Servers (IIS, Apache): Introduction – HTTP request Types – System Architecture – Client side scripting vs Server Side Scripting - Microsoft Internet Information Server (IIS) – Apache Web Server – Requesting documents

TEXT BOOKS:

1. DEITEL & DEITEL: Internet & World Wide Web - How to Program, Pearson Education -Third Edition

REFERENCE BOOKS

2. Ivan Bayross : HTML, DHTML , Java Script , Perl, CGI, BPB
3. Web Technologies by Achyut S Godbole and Atul Kahate, TMH

43002 paper II: Dot Net programming

UNIT 1:

Fundamentals of Visual Basic, Exception handling, windows forms, Control Classes, Different Types of Boxes, Labels, Buttons, Panels. (Chapters 1 to 7)

UNIT 2:

WINDOWS FORMS: Different types of Bars, Menus, Views. **OBJECT - ORIENTED PROGRAMMING:** Classes and objects constructors and destructors, inheritance, modifiers, Interfaces, Polymorphism, Vate Binding, Graphics handling and File handling. (Chapters 8 to 13)

UNIT 3:

WEB FORMS: Working with webforms, Web forms and HTML, The Web control class, Web Forms and Boxes, Web Forms and Buttons, Validation Controls, Ad Rotators, Web Forms and HTML controls. (Chapters 14 to 19)

UNIT 4:

DATA ACCESS WITH ADO.NET: Accessing data with the server explorer, Data adapters and Data sets, Binding Controls to databases, Handling databases in code, Database access in Web Applications. Creating user Controls, Web user Controls, and Multithreading creating Windows services, Web Services and Deploying applications. (Chapters 30 to 25)

TEXT BOOK:

1. VB.NET PROGRAMMING (BLACK BOOK) BY STEVEN HOLZNER (Dreamtech-3003)

REFERENCE BOOKS:

1. VB.NET PROGRAMMING BY T. GADDIS (Dreamtech)
2. Microsoft Visual Basic. Net step by step By Halvorsron (PHI)
3. OOP with Microsoft Visual Basic.Net By Reynold Hacrtte (PHI)

43003 Paper-III: Advanced JAVA programming

UNIT 1:

FILES AND STREAMS: Introduction, Data Hierarchy, Files and Streams, Creating a Sequential-Access File, Random-Access Files, Reading Data Sequentially from a Random-Access File.

NETWORKING: Introduction, Manipulating URLs, Reading a File on a Web Server, Establishing a Simple Server, Establishing a Simple Client, Client/Server Interaction with Stream Socket Connections, Connectionless Client/Server Interaction with Datagrams, Client/Server Tic-Tac-Toe Using a Multithreaded Server, Security and the Network. (Chapter 17 and 21 of Book 1)

UNIT 2:

JDBC DATABASE ACCESS: JDBC Basics, New Features in the JDBC 2.0 API (Chapter 26 and 27 of Book 2)

UNIT 3:

REMOTE METHOD INVOCATION (RMI): Introduction, Case Study: Creating a Distributed System with RMI, Defining the Remote Interface Implementing the Remote Interface, Define the Client, Compile and Execute the Server and the Client.

UNIT 4:

SERVLETS: Overview of Serves, Interacting with Clients, The Life Cycle of a Servlet, Saving Client State, The servletrunner Utility, Running Servlets. (Chapters 34 to 39 of Book 2)

TEXT BOOKS:

1. JAVA How to Program Third Edition - Deitel & Deitel
2. The JAVA Tutorial Continued Compione, Walrath, Huml, Tutorial Team - Addison Wesley

REFERENCE BOOKS:

1. Java tutorial continued – campione (addison wesley)
2. The complete reference java 2 (fourth edition) by - patrick naughton & herbet schildt (TMH)
3. Programming java - decker&hirsh field vikas publisking (3001) (thomson learning) (second edition)
4. Introduction to java programming - Y.Daniel Liang PHI(3002)
5. Object oriented programming through JAVA2 by - Thamus WU (Mc.Graw Hill)
6. JAVA 2 - Dietel & Dietel (Pearson Education)
7. Introduction to JAVA –Bala Guru Swamy

43004A Elective-I: Formal Language Automata Theory

UNIT 1:

Fundamentals : Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non deterministic finite automaton, transition diagrams and Language recognizers.

Finite Automata : NFA with ϵ transitions - Significance, acceptance of languages. Conversions and Equivalence : Equivalence between NFA with and without ϵ transitions, NFA to DFA conversion, minimisation of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Melay machines.

UNIT 2:

Regular Languages : Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

Grammar Formalism : Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms.

Right most and leftmost derivation of strings.

UNIT 3:

Context Free Grammars : Ambiguity in context free grammars. Minimisation of Context Free Grammars. Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).

Push Down Automata : Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required). Introduction to DCFL and DPDA.

UNIT 4:

Turing Machine : Turing Machine, definition, model, design of TM, Computable functions.

TEXT BOOKS:

1. "Introduction to Automata Theory Languages and Computation" Hopcroft H.E. and Ullman J. D. Pearson Education
2. Introduction to Theory of Computation – Sipser 2nd edition Thomson

REFERENCE BOOKS:

1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to languages and the Theory of Computation, John C Martin, TMH
3. "Elements of Theory of Computation" Lewis H.P. & Papadimition C.H. Pearson /PHI.
- 4 Theory of Computer Science – Automata languages and computation -Mishra and Chandrashekar, 2nd edition, PHI

43004B Elective-I: Information Systems

UNIT I

Overview of System analysis and design: Development life cycle, Requirements determination, Logical design, Physical design, Program design, Risk and feasibility analysis, SRS, prototyping

UNIT II

Information requirement analysis: Process modelling with physical and logical data flow diagrams, Data modelling with entity relationship diagrams, Addition modelling method, Developing proposal: feasibility studies, cost benefit analysis.

UNIT III

System design: Process descriptions, Input/output controls, object modelling, Database design, and User Interface design, Documentation

UNIT IV

Introduction to - Project management, scheduling, measurement of quality and productivity, ISO and capability maturity models, Strategic planning, system audit. Quality assurance: reviews, walkthroughs, and inspection.

REFERENCE BOOKS:

1. Analysis & Design of Information Systems, Senn,MH.
2. Information Systems :Analysis & Design, Ram Bansal 'Vigyacharya',New Age International
3. Analysis, Design of Information System,Rajaraman, PHI
4. System Analysis & Design, Parthasarathi,EPH
5. System Analysis, Design & MIS, EXCEL BOOKS
6. Analysis, Design & implementation of Information Systems, Sharma, VIKAS
7. System Analysis & Design Hand Book, V.K. Jain, Wiley Dreamtech

43004C Elective-I: Machine Learning

UNIT - I

Introduction - Well-posed learning problems, designing a learning system Perspectives and issues in machine learning

Concept learning and the general to specific ordering – Introduction, A concept learning task, concept learning as search, Find-S: Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate Elimination algorithm, Remarks on Version Spaces and Candidate Elimination, Inductive Bias.

Decision Tree Learning – Introduction, Decision Tree Representation, Appropriate Problems for Decision Tree Learning, The Basic Decision Tree Learning Algorithm Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning.

UNIT - II

Artificial Neural Networks Introduction, Neural Network Representation, Appropriate Problems for Neural Network Learning, Perceptions, Multilayer Networks and the Back propagation Algorithm. Discussion on the Back Propagation Algorithm, An illustrative Example: Face Recognition **Evaluation Hypotheses** – Motivation, Estimation Hypothesis Accuracy, Basics of Sampling Theory, A General Approach for Deriving Confidence Intervals, Difference in Error of Two Hypotheses, Comparing Learning Algorithms.

UNIT - III

Bayesian learning - Introduction, Bayes Theorem, Bayes Theorem and Concept Learning Maximum Likelihood and Least Squared Error Hypotheses, Maximum Likelihood Hypotheses for Predicting Probabilities, Minimum Description Length Principle , Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier, An Example: Learning to Classify Text, Bayesian Belief Networks, EM Algorithm. **Computational Learning Theory** – Introduction, Probably Learning an Approximately Correct Hypothesis, Sample Complexity for Finite Hypothesis Space, Sample Complexity for Infinite Hypothesis Spaces, The Mistake Bound Model of Learning.

Instance-Based Learning – Introduction, k-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

UNIT - IV

Pattern Comparison Techniques, Temporal patterns, Dynamic Time Warping Methods, Clustering, Codebook Generation, Vector Quantization

Pattern Classification: Introduction to HMMS, Training and Testing of Discrete Hidden Markov Models and Continuous Hidden Markov Models, Viterbi Algorithm, Different Case Studies in Speech recognition and Image Processing

Analytical Learning – Introduction, Learning with Perfect Domain Theories: PROLOG-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operations.

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis.

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, MGH
2. Fundamentals of Speech Recognition By Lawrence Rabiner and Biing – Hwang Juang.

REFERENCE BOOKS:

1. Machine Learning : An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

43004D Elective-I: Big Data Analytics

UNIT 1:

Introduction to Big Data: Big Data-definition, Characteristics of Big Data (Volume, Variety, Velocity), Data in the Warehouse and Data in Hadoop, Why is Big Data Important? Patterns for Big Data Development

UNIT 2:

Introduction to Hadoop: Hadoop- definition, Understanding distributed systems and Hadoop, Comparing SQL databases and Hadoop, Understanding MapReduce, Counting words with Hadoop-running your first program, History of Hadoop, Starting Hadoop - The building blocks of Hadoop, NameNode, DataNode, Secondary NameNode, JobTracker and Task Tracker, MapReduce -A Weather Dataset, Analyzing the Data with Unix Tools, Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Hadoop Pipes.

UNIT 3:

HDFS: Components of Hadoop -Working with files in HDFS, Anatomy of a MapReduce program, Reading and writing

The Hadoop Distributed Filesystem -The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop Filesystem, The Java Interface, Data Flow, Parallel Copying with distcp, Hadoop Archives

UNIT 4:

MapReduce Advanced Programming: Writing basic MapReduce programs - Getting the patent data set, constructing the basic template of a MapReduce program, Counting things, Adapting for Hadoop's API changes, Streaming in Hadoop, Improving performance with combiners, Advanced MapReduce – Chaining MapReduce jobs, joining data from different sources, creating a Bloom filter

TEXT BOOKS:

1. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch ,—Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data, 1st Edition, TMH,2012.
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop in Practice by Alex Holmes, MANNING Publ.

REFERENCE BOOKS:

1. Data Divination: Big Data Strategies, 1st Edition, Pam Baker, Bob Gourley, Cengage

43005A Elective-II: Human Computer Interaction

UNIT1:

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design, The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT 2:

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT 3:

Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT 4:

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia

REFERENCE BOOKS:

1. Human – Computer Interaction. Alan Dix, Janet Finckay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
2. User Interface Design, Soren Lauesen , Pearson Education.

43005B Elective-II: Management Information System

UNIT I

The meaning and role of MIS: What is MIS? Decision support systems, systems approach, the systems view of business, MIS organization within the company, Managers view of Information systems. Management organizational theory and the systems approach - Development of organizational theory, organizational behavior, management - information and the systems approach – Data processing and the computer – components of computer system – computer based information system –Applications Information systems for decision making: Evolution of an information system - Basic information systems - decision making and MIS - MIS as a technique for making programmed decisions - decision assisting information systems –DSS

UNIT II

Strategic and project planning for MIS: General business planning - appropriate MIS response - MIS planning general - MIS planning details.

Conceptual system design: Define the problems - set system objectives - establish system constraints - determine information needs - determine information sources - develop alternative conceptual designs and select one - prepare the conceptual design report.

Detailed system design: Inform and involve the organization - aim of detailed design - project management of MIS detailed design - identify dominant and trade off criteria - sketch the detailed operating subsystems and information flows – automation - inputs, outputs, and processing - software, hardware and tools - propose an organization to operate the system - document the detailed design - revisit the manager-user.

UNIT III

Implementation, evaluation and maintenance of the MIS: Plan the implementation - acquire floor space and plan space layouts - organize for implementation - develop procedures for implementation train the operating personnel - computer related acquisitions - develop forms for data collection and information dissemination - develop the files - test the system - evaluate the MIS - control and maintain the system.

Pitfalls in MIS development: Fundamental weaknesses - soft spots in planning - design problems - implementation

UNIT IV

Systems concepts and control: Systems classifications – concepts – control: Key system concept – business organization as a system – control and system design

Management science and systems modeling for MIS: What is Management science? – What are models? – Kinds and use of models for analysis of systems characteristics – simulation – construction of models Case studies

TEXT BOOK:

1. Information systems for modern management, 3rd Edition by R.G Murdick, J.E Ross and J. R clagget, PHI-2004.

REFERENCE BOOKS:

1. Management Information Systems, 9/e, Laudon & Laudon, V.M.Prasad, Pearson, 2005,
2. Management Information Systems , C.S.V.Murthy, Himalaya Publications, 2004

43005C Elective-II: Computer Graphics

UNIT 1:

A survey of computer graphics: computer aided design-presentation graphics-computer art-entertainment-education and training-visualisation-image processing-graphical user interface, overview of graphics systems, output primitives

UNIT 2:

Bresenham technique – Line Drawing and Circle Drawing Algorithms - DDA - Line Clipping - Text Clipping.

Two dimensional transformations – Scaling and Rotations - Interactive Input methods - Polygons– Splines – Bezier Curves - Window view port mapping transformation.

UNIT 3:

3D Concepts - Projections – Parallel Projection - Perspective Projection – Visible Surface Detection Methods - Visualization and polygon rendering – Color models – XYZ-RGB-YIQ-CMY-HSV Models - animation – Key Frame systems - General animation functions - morphing.

UNIT 4:

Multimedia hardware & software - Components of multimedia – Text, Image – Graphics – Audio – Video – Animation – Authoring.

Multimedia communication systems – Data base systems – Synchronization Issues – Presentation requirements – Applications – Video conferencing – Virtual reality – Interactive video – video on demand.

TEXT BOOKS:

1. Hearn D and Baker M.P, "Computer graphics – C Version", 2nd Edition, Pearson Education, 2004.
2. Ralf Steinmetz, Klara Steinmetz, "Multimedia Computing, Communications and Applications", Pearson education, 2004

REFERENCE BOOKS:

1. Siamon J. Gibbs and Dionysios C. Tsichritzis, "Multimedia programming", Addison Wesley, 1995.
2. John Villamil, Casanova and Leony Fernandez, Eljar, "Multimedia Graphics", PHI, 1998.

43005D Elective-II: PHP

UNIT1:

INTRODUCTION: Introduction to Open sources – Need of Open Sources–Advantages of Open Sources– Application of Open Sources. Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode

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 – Usings equences – MySQL and Web.

UNIT2:

Introduction to PHP : Evaluation of Php Basic Syntax Defining variable and constant Php Data type Operator and Expression, Handling Html Form With PHP, Capturing Form Data Dealing with Multi-value filed Generating File uploaded form Redirecting a form after submission

UNIT3:

Decisions and loop :

Making Decisions Doing Repetitive task with looping Mixing Decisions and looping with Html

Function :

What is a function Define a function Call by value and Call by reference Recursive function **String**

Creating and accessing String Searching & Replacing String Formatting String String Related Library function

UNIT4:

Array :

Anatomy of an Array Creating index based and Associative array Accessing array Element

Looping with Index based array Looping with associative array using each() and foreach() Some useful Library function

Working with file and Directories:

Understanding file& directory Opening and closing a file Coping ,renaming and deleting a file Working with directories Building a text editor File Uploading & Downloading

TEXT BOOKS:

1. Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003
2. Steve Suchring, "MySQL Bible", John Wiley, 2002
3. Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata McGraw- Hill Publishing Company Limited, Indian Reprint 2009.

REFERENCE BOOKS:

1. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002
2. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2001
3. Martin C. Brown, "Perl: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
4. Vikram Vaswani, "MYSQL: The Complete Reference", 2nd Edition, Tata McGraw -Hill Publishing Company Limited, Indian Reprint 2009.

PRACTICALS

43001P: Web Technologies Laboratory

1. Create your own Resume using HTML 5 Tags
2. Debug and validate your HTML document (Resume) using W3C validator and fix the issues.
3. Add Styles to your Resume using CSS 3 Properties.
 - a. Add External, Internal and Inline CSS styles to know the priority.
 - b. Add CSS3 Animation to your profile.
4.
 - a. Add functionalities that use any 2 of HTML 5 API"s.
 - b. Create a student Registration form for Job Application and validate the form fields using JavaScript
5.
 - a. Create a CGPA Calculator in Web Brower using HTML, CSS and JavaScript. Use functions in JavaScript.
 - b. Create a Quiz Program with adaptive questions using JavaScript.
6. Create a Pan Card Validation form using Object Oriented JavaScript, consider the 10th character to be an alphabet.
 - a. Get the user"s First Name, Last Name and other required fields as input
 - b. Assume the last digit of the Pan Number to be an alphabet
 - c. Validate the PAN Number
7.
 - a. Create an online Event Registration form and validate using JQuery
 - b. Create an online video Player which will allow you to play videos from the system and also create custom playlist using JQuery.
8. Construct a JSON Structure for a bookstore and validate it using JSON Validator such as <http://jsonlint.com/> and parse the Json file to list the books under the category "Fiction". Use Javascript or JQuery for parsing
9. Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.
10. Develop a Social Media Web Application using HTML5, CSS3, JQuery, AJAX & PHP.

43002P: Dot Net Programming Laboratory

1. Design and develop a program to process electricity bill with the given condition by choosing console application.
2. Design and develop a program to demonstrate array of strings by using console application.
3. Design and develop a program to demonstrate exception handling by using console application.
4. Design and develop a VB.Net program for login form creation by using Windows form application.
5. Design and develop a VB.Net program for calculating simple interest and compound interest by using radio buttons.
6. Design and develop a VB.Net program to demonstrate ComboBox, ListBox and CheckedListBox.
7. Design and develop a VB.Net program to demonstrate Menu creation.
8. Design and develop a VB.Net program to demonstrate Status Bar.
9. Design and develop a VB.Net program for Single Inheritance.
10. Design and develop a VB.Net program for Graphics Handling.
11. Design and develop a VB.Net program to Create a Directory and Copy the selected file to the Directory.
12. Design and develop a VB.Net program to write a File using Console application.
13. Design and develop a web form for validating whether the person is eligible for vote or not.
14. Design and develop a Registration form to demonstrate validation controls in ASP.Net.
15. Design and develop a web form for demonstration of AdRotator control in ASP.Net.
16. Design and develop a form to s Inserting, deleteting, update and Searching records from database

43003P: Advanced JAVA Programming Laboratory

1. Programme to illustrate the File Class.
2. Programme to illustrate the IO, Utility Package & Display the File Properties.
3. Programme to illustrate the File Input Stream.
4. Programme to illustrate the nio, io package.
5. Programme for simple Railway Reservation System.
6. Programme to illustrate the Client & Server.
7. Programme for DDL, DML operations on a database through JDBC.
8. Programme for DDL, DML operations of a Database through JDBC prepared Statement.
9. Programme for DDL, DML operations of a Database through JDBC to Result set Metadata.
10. Programme for RMI Methods.
11. Programme to using of servlet print the current date & time.
12. Programme to demonstrate JAVA URL class.

NON-CORE SYLLABUS

CBCS-I: Introduction to Computers and MS-Office

UNIT 1:

Exploring Computers and their Uses: Computers in our World, the Computer defined, Computer for individual users, Computer for Organizations, Computer in Society, Why was Computers so important.

Types of Storage Devices: An ever-growing need, Categorizing storage devices, Magnetic Storage Devices-How data is stored on a disk, how data is organized on magnetic disk, how the operating system finds data on a disk, Diskettes, hard disks, removable high-capacity magnetic disks, tape drivers, optical storage devices, solid-state storage devices, smart cards, solid-state disks.

Operating System Basics: Introduction to OS, Types of Operation System, Evolution of OS, purpose of operating systems, functions of an OS, Modern OS (windows 9x, Windows XP, NT, Some Windows server OS), Introduction to UNIX OS, Introduction to LINUX OS, Basic commands.

UNIT2: MS-WORD

Word Basics: Starting word, creating a new document, operating preexisting document, the parts of a word window, typing text, selecting text, deleting text, undo, redo, repeat, inserting text, replacing text, formatting text, cut, copy, paste-formatting text and document: Auto format, Line spacing margins, Boards and shading.

Header and Footer: Definition of header and footer, creating basic header and footer, creating different headers and footers for odd and even pages.

Tables: Creating a simple table, creating a table using the table menu. Entering and editing text in the table, selecting table, adding rows, deleting rows, changing row height, inserting columns, deleting columns, changing column width.

Graphics: Importing graphics, Clip Art, insert picture, Clip Art Gallery. Using word's drawing features, drawing objects, text in drawing.

Macros: Macro. Record Macros, Editing macros, running a macro.

Mail Merge: Mail Merge Concept, Main document, data sources, merging data source and main document, overview of word menu options word basic tool bar.

UNIT 3: MS-EXCEL

Excel Basics: Overview of Excel features, Getting Started, creating a new worksheet, selecting cells, Entering and editing text, entering and editing numbers, entering and editing formulas, Referencing cells, moving cells, copying cells, sorting cell data.

Formatting: Page setup, changing height and width of row & column. Auto format, changing font sizes and attributes, centering text across columns, using borders buttons and commands, changing colors and shading, hiding rows and columns.

Introduction to Functions: Parts of Functions, Functions requiring add-ins, the function wizard, examples functions by category: Date and Time functions, Engineering Functions, Math and Trig Functions, Statistical Functions, Text Functions.

Excel Charts: Chart parts and technology, instant charts with the chart wizard, creation of different types of charts, printing charts, deleting charts, linking in excel.

UNIT 4: MS-POWER POINT

Power Point Basics: Terminology, Getting Started, Views. Creating Presentations: Using auto content wizard, Using blank presentation option, Using design template option, Adding and deleting slides, Importing image from the outside world, Drawing in power point, Transitions and build effects, Deleting a slide, numbering a slide saving presentation. Closing presentation, printing presentation elements.

TEXT BOOKS

1. Peter Norton, Introduction to Computers, Sixth Edition, Tata MC Graw Hill (2007)
2. Ran Mansfield. Working in Microsoft Office, Tata MC Graw Hill (2008)

REFERENCE BOOKS

1. Michael Miller, Absolute Beginner's guide to computer Basics, Fourth Edition, Pearson Education (2007)
2. Deborah Morly, Charles S. Parker, understanding computers to day and tomorrow , 11th edition, Thomson
3. Ed Bott, woody Leonhard, using Microsoft Office 2007, Pearson Education (2007)

53001 Paper-I: Cryptography and Network Security

UNIT 1:

Introduction: Security trends, OSI Security Architecture, Security Attacks, services and mechanisms, Model for Network Security.

Classical techniques: Symmetric Cipher model, Substitution Techniques, Transposition Techniques, Steganography.

Modern techniques: Simplified DES, block cipher principles, data encryption standard, strength of DES, differential and linear crypt analysis, block cipher design principles and modes of operations. Algorithms: Triple DES, international data encryption algorithm, characteristics of advanced symmetric block ciphers.

UNIT 2:

Conventional encryption: Placement of encryption function, traffic confidentiality, key distribution.

Public key cryptography: Principles of public key cryptosystems, RSA algorithm, key management, Diffie-Hellman key exchange.

Message authentication and hash functions: Authentication requirements and functions, Message Authentication, Hash functions, security of hash functions and Macs

UNIT 3:

Authentication applications: Kerberos, X.509 directory authentication service. Electronic mail security: Pretty good privacy, S/MIME.

UNIT 4:

System Security: Intruders, Intrusion detection, Password management. Malicious Software: Virus and related threats, Virus counter measures. Firewall: Firewall design principles, Trusted systems.

TEXT BOOKS:

1. Cryptography and Network Security: Principles and Practice – William Stallings, Pearson Education.
2. Network Security Essentials (Applications and Standards) by William Stallings, Pearson Education.

REFERENCE BOOKS:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech Press)
2. Network Security – Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Introduction to Cryptography, Buchmann, Springer.

53002 Paper-II: Cloud Computing

UNIT 1:

Systems modeling, Clustering and virtualization: Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency

UNIT 2:

Virtual Machines and Virtualization of Clusters and Data Centers: Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

UNIT 3:

Cloud Platform Architecture: Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

UNIT 4:

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

TEXT BOOKS:

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madiseti, University Press

REFERNCE BOOK:

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

53003 Paper-III: Data Warehousing & Data Mining

UNIT1:

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining.

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

UNIT2:

Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse. Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.

UNIT3:

Concepts Description: Characterization and Comparison: Data Generalization and Summarization-Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

Mining Association Rules in Large Databases: Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT4:

Classification: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

TEXT BOOKS:

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.

REFERENCE BOOKS:

1. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION
2. Data Mining Techniques – ARUN K PUJARI, University Press.
3. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
4. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION.
5. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT EDITION.

53004A Elective III : Digital Image Processing

UNIT 1:

INTRODUCTION: What is Digital Image Processing, The origins of Digital Image Processing, Examples of Fields that use Digital Image Processing, Fundamentals steps in Digital Image Processing, Components of an Image Processing System

DIGITAL IMAGE FUNDAMENTALS: Elements of Visual Perception, Light & Electro magnetic spectrum, Image sensing and acquisition, Image sampling & quantization, some basic relationships between pixels, Linear and non linear operations.

UNIT2:

IMAGE ENHANCEMENT IN THE SPATIAL DOMAIN: Background, some gray level transformations, histogram processing , enhancement using arithmetic/logic operations, basics of spatial filtering, smoothing spatial filters, sharpening spatial filters, combining spatial enhancement methods

IMAGE ENHANCEMENT IN THE FREQUENCY DOMAIN: Background, Introduction to fourier transform and frequency domain, smoothing frequency domain filters, sharpening frequency domain filters, homomorphism filtering, implementation.

UNIT 3:

IMAGE RESTORATION: A model of the image degradation, restoration process, noise models, restoration in the presence of noise only spatial filtering, periodic noise reduction by frequency domain filtering, Linear, position invariant degradation, Estimating the degradation function, inverse filtering, minimum mean square error filtering, constrained least squares filtering, geometric mean filter, geometric transformation

UNIT 4:

IMAGE COMPRESSION: Fundamentals, image compression models, elements of information theory, error free compression, lossy compression, image compression standards

TEXT BOOKS:

1. Digital Image Processing by Rafael C. Gonzalez & Richard E. Woods, Second Edition, Pearson Education.

REFERENCE BOOKS:

1. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
2. Digital Image Processing by S Jayaraman, S Esakkirajan, T VeeraKumar (Tata McGraw Hill Education Pvt Ltd)
3. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications
4. Digital Image Processing using Matlab, Rafeal C.Gonzalez, Richard E.Woods, Steven L. Eddins, Pearson Education.
5. Digital Image Processing, William K. Prat, Wily Third Edition
6. Digital Image Processing and Analysis, B. Chanda, D. Datta Majumder, Prentice Hall of India.

53004B Elective III: Wireless & Ad-hoc Networks

UNIT-I:

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

UNIT-II:

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

UNIT-III:

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

UNIT-IV:

Mobile Ad Hoc Networks (MANETs): Overview, Properties of A MANET, Spectrum of MANET Applications, Routing and Various Routing Algorithms. Other Wireless Technologies: Introduction, IEEE 802.15.4 and Zigbee, General Architecture, Physical Layer, MAC layer, Zigbee, WiMAX and IEEE 802.16, Layers and Architecture, Physical Layer, OFDM Physical layer.

TEXT BOOKS:

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

REFERENCES BOOKS:

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

53004C Elective III: E-Commerce

UNIT 1:

Electronic Commerce Environment and Opportunities: Background, The Electronic Commerce Environment, Electronic Marketplace Technologies. Modes of Electronic Commerce: Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with www/Internet, Commerce Net Advocacy, web Commerce Going Forward. Approaches to Safe Electronic Commerce: Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol (SEPP), Secure Electronic Transaction (SET), Certificates for authentication Security on web Servers and Enterprise Networks.

UNIT 2:

Electronic Cash and Electronic Payment Schemes: Internet Monetary Payment & Security Requirements. Payment and Purchase Order Process, On-line Electronic cash. Internet/Intranet Security Issues and Solutions: The need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption, Enterprise Networking and Access to the Internet, Antivirus Programs, Security Teams.

UNIT 3:

Master Card/Visa Secure Electronic Transaction: Introduction, Business Requirements, Concepts, payment Processing. E-Mail and Secure E-mail Technologies for Electronic Commerce: Introduction, The Means of Distribution, A model for Message Handling, E-mail working, Multipurpose Internet Mail Extensions, Message Object Security Services, Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet.

UNIT 4:

Internet Resources for Commerce: Introduction, Technologies for web Servers, Internet Tools Relevant to Commerce, Internet Applications for Commerce, Internet Charges, Internet Access and Architecture, Searching the Internet. Advertising on Internet: Issues and Technologies. Introduction, Advertising on the Web, Marketing creating web site, Electronic Publishing Issues, Approaches and Technologies: EP and web based EP.

TEXT BOOKS

1. Web Commerce Technology Handbook, by Daniel Minoli, Emma Minoli, McGraw-Hill

REFERENCE BOOKS:

1. E-Commerce – Strategy, Technology and Applications By David Whiteley (McGraw Hill)

53004D Elective III: Grid Computing

UNIT I

Introduction – Early Grid Activities, Current Grid Activities, an overview of Grid business areas, Grid applications, Grid infrastructure – Grid computing organizations and their roles – Grid computing Anatomy – Grid computing Roadmap

UNIT II

Service-Oriented and ,Web Service Architecture- XML Messages and enveloping – Service message description mechanisms, relationship between web and grid service – Sample use cases that drive OGSA – The OGSA Platform components

UNIT III

A high level introduction to OGSI – Technical details of OGSI specification, Service data concepts - Grid Service: Naming and change Management – OGSA Basic Services: Common Management Model, Service domains, Policy and Security Architecture

UNIT IV

The Grid Computing Toolkits – GLOBUS GT3 Toolkit: Architecture - GLOBUS GT3 Toolkit: Programming Model

TEXTBOOK

1. Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson-2004.

REFERENCE

1. Ahmar Abbas, "Grid Computing: A Practical Guide to technology and Applications", Firewall media – 2006.

53005A Elective IV: Enterprise Application Integration

UNIT I

Defining EAI : What Is EAI?, Applying Technology, How Did Things Get This Bad?, Chaos Today, Order Tomorrow.

Evolution of Stovepipes: Traditional Systems, Microcomputer Systems, Distributed Systems, Packaged Applications.

Making the Business case for EAI: The Virtual System, E-Business, Types of EAI.

UNIT II

Data-Level EAI: Going for the Data, Data-Level EAI by Example, Database-to-Database EAI, Federated Database EAI.

Consider the Data Source: Relational Data, Object-Oriented, Multidimensional, Other Data Storage Models

Application Interface-Level EAI: Application Interfaces, What's an API?, Interface by Example, Approaching Application Interfaces, The Interface Tradeoff, Packaged Applications, Custom Applications.

UNIT III

Method-Level EAI: Method-Level Example, What's a Process?: Scenarios, Rules, Logic, Data, Objects.

Method Warehousing: Leveraging Frameworks for EAI, Enabling Technology, Sharing Methods to Bind Your Enterprise.

User Interface-Level EAI: Leveraging User Interface-Level EAI, Going to the User Interface.

UNIT IV

The EAI Process—Methodology or Madness?: Applying a Procedure/Methodology, Understanding the Enterprise and Problem Domain, Making Sense of the Data, Making Sense of the Processes, The Common Business Model, Identifying Application Interfaces, Identifying the Business Events, Identifying the Schema and Content Transformation Scenarios, Mapping Information Movement, Applying Technology, Testing, Testing, Testing, Considering Performance, Defining the Value, Creating Maintenance Procedures, Method or Madness?

TEXT BOOKS

1. David S. Linthicum, Enterprise Application Integration, Addison Wesley Information Technologies Series, printed December 2003.

53005B Elective IV: Distributed Systems

UNIT 1:

Characterization of Distributed Systems-Introduction-Examples-Resource Sharing and the Web-Challenges. System Models-Architectural-Fundamental.

Interprocess Communication-Introduction-API for Internet protocols-External data representation and marshalling--Client-server communication-Group communication-Case study: Interprocess Communication in UNIX.

UNIT 2:

Distributed Objects and Remote Invocation-Introduction-Communication between distributed objects-Remote procedure calls-Events and notifications

Case study: Java

RMI, Operating System Support-Introduction-OS layer-Protection-Processes and threads-Communication and invocation OS architecture.

UNIT 3:

Distributed File Systems-Introduction-File service architecture-Case Study: Sun Network File System-Enhancements and further developments.

Name Services-Introduction-Name Services and the Domain Name System-Directory Services Case Study: Global Name Service.

UNIT 4:

Time and Global States-Introduction-Clocks, events and process states-Synchronizing physical clocks-Logical time and logical clocks-Global states-Distributed debugging. Coordination and Agreement-Introduction-Distributed mutual exclusion-Elections- Multicast communication-Consensus and related problems.

TEXT BOOK:

1. George Coulouris, Jean Dollimore, Tim Kindberg, , "Distributed Systems: Concepts and Design", 4th Edition, Pearson Education, 2005.

REFERENCE BOOKS:

1. A.tS. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, Prentice Hall, 2006.
2. M.L.Liu, —Distributed Computing Principles and Applicationsll, Pearson Addison Wesley, 2004.
3. Mukesh Singhal, —Advanced Concepts In Operating Systemsll, McGrawHill Series in Computer Science, 1994.
4. Nancy A. Lynch, "Distributed Algorithms", The Morgan Kaufmann Series in Data Management System, Morgan Kaufmann Publishers, 2000.

53005C Elective IV: Software Testing

UNIT-I:

Building a software Testing strategy, software Test Design Techniques, software Testing tools and selection of Test Automation products.

UNIT-II:

Software Testing Life cycle and software testing process, testing Effort estimation and test planning, software test effort estimation technique.

UNIT-III:

Pre-Development testing: requirements and Design phase, Best practices in program phase: UNIT Testing, System Testing and integration testing, case study on acceptance testing.

UNIT-IV:

Implementing and Effective Test Management Process, Building and Effective test organization, performance issues and optimization techniques.

TEXT BOOKS:

1. Renu Rajani and pradeep Oak,, software testing, tata Mc Graw Hill.

53005D Elective IV: Theory of Computation

UNIT 1:

Fundamentals : Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non deterministic finite automaton, transition diagrams and Language recognizers.

Finite Automata : NFA with ϵ transitions - Significance, acceptance of languages. Conversions and Equivalence : Equivalence between NFA with and without ϵ transitions, NFA to DFA conversion, minimisation of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Melay machines.

UNIT 2:

Regular Languages : Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

Grammar Formalism : Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms.

Right most and leftmost derivation of strings.

UNIT 3:

Context Free Grammars : Ambiguity in context free grammars. Minimisation of Context Free Grammars. Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).

Push Down Automata : Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required). Introduction to DCFL and DPDA.

UNIT 4:

Turing Machine : Turing Machine, definition, model, design of TM, Computable functions.

TEXT BOOKS:

3. "Introduction to Automata Theory Languages and Computation" Hopcroft H.E. and Ullman J. D. Pearson Education
4. Introduction to Theory of Computation – Sipser 2nd edition Thomson

REFERENCE BOOKS:

4. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
5. Introduction to languages and the Theory of Computation, John C Martin, TMH
6. "Elements of Theory of Computation" Lewis H.P. & Papadimition C.H. Pearson /PHI.
- 4 Theory of Computer Science – Automata languages and computation -Mishra and Chandrashekar, 2nd edition, PHI

53001P: Cryptography and Network Security Laboratory

1. write a programme to implement Ceaser Cipher.
2. write a programme to implement hill cipher.
3. write a programme to implement Simplified DES.
4. write a programme to implement Double EES
5. write a programme to implement Triple DES.
6. write a programme to implement different Modes of DES.
7. write a programme to implement RSA Algorithms.
8. write a programme to implement Diffie-Hellman Key exchange Algorithm.

53002P: Cloud Computing Laboratory

1. Installation and configuration of oracle virtual box for Windows XP and Android.
2. Installation and configuration of Hadoop.
3. Using Hadoop for counting word frequency with map reduce
4. Service development research and users over cloud-google app
5. Service development research and users over amazon web services.
6. Cloud security Management
7. Performance evaluation of Services over Cloud-Google App
8. Performance evaluation of Services over Amazon Web Services.

NON-CORE SYLLABUS

CBCS-II: Internet and World Wide Web

UNIT 1:

Telecommunications and Networks: The Telecommunications system, networks, network communication software, network processing strategies, Telecommunication applications

The Internet, Intranets and Extranets: What exactly is the Internet?, the evolution of the Internet, the operation of the Internet, services provided by the Internet, the World Wide Web, Internet Challenges, Intranets, Extranets.

UNIT2:

Internet Communication Protocols: Internet hosts, Servers and Clients, Port and Port Numbers, Domain Name System and DNS Servers.

Types of Internet Connections: Dial-up Connection, DSL, ISDN, Leased-lines, Cable-TV Internet, Satellite Internet, Wireless internet Connections, Connecting LAN to the Internet.

UNIT3:

Web Browsers: What is a Web Browser, Main functions, Types of Web Browsers, Main Elements of Web Browsers, Browsing the Web, Search Engines Web Directories, Navigating Web Pages, Domain Name System, Uniform Resource Locator.

UNIT4:

Email Concepts: How do you get your email, Email Addressing, Message Headers, Email Netiquette, General Information about attachments, Downloading and Storing Data:

TEXT BOOKS

1. EFRAIM Turban, R.Kelly Rainer, Richard E.Potter, —"Introduction to Information Technology" John Wiley(2008)
2. Margaret Levine Young, Internet: The Complete Reference, Second Edition, McGraw-Hill/Osborne

REFERENCE BOOKS

1. ITL Education Solutions Ltd., —Introduction to Information Technology, Pearson India (2008).