

First Year			
Sno.	Paper I	Theory	Practical
1	Computer Fundamental & Office Automation	75	25
2	Programming in „C“		
	Paper II	75	25
3	Introduction to Algorithm		
4	Introduction to Digital Circuits		
5	Operating System and Linux		
Second Year			
	Paper III	75	25
6	Object Oriented Programming in C++		
7	Concepts of Communication and Networking		
	Paper IV	75	25
8	Database Management Systems		
9	System Analysis and Designing		
10	Data Structures using „C“		
Third Year			
	Paper V	75	25
11	Windows Programming using Visual Basic		
12	E-Commerce		
13	Artificial Intelligence		
	Paper VI	75	25
14	Object Oriented Technology and Java		
15	Internet Concepts and Web Design		
	Paper VII	100	
16	Practical		
	Paper VIII		
17	Project Work	100	
	Subsidiary		
18	Basic Mathematics	100	
19	Business Communication	100	
20	Hindi Composition	100	

Full Marks – 100

(Theory – 75 Practical -25)

Computer Fundamental & Office Automation

Unit I : What is Computer, Characteristics of Computers, Block diagram of computer, Types of computers and features, Mini Computers, Micro Computers, Mainframe Computers, Super Computers, Types of Programming Languages, Machine Languages, Assembly Languages, High Level Languages

Unit II : The Memory System The Memory Hierarchy , RAM, ROM, DRAM, Flash Memory, Secondary Memory and Characteristics, Hard Disk Drives, Optical Memories, CCDs, Bubble Memories, RAID and its Levels, The Concepts of High Speed Memories, Cache Memory, Cache Organisation, Memory Interleaving , Associative Memory, Virtual Memory, The Memory System of Micro-Computer

Unit III : The Input/Output System Input/Output Devices or External or Peripheral Devices, The Input Output Interface, The Device Controllers and its Structure, Device Drivers, Input Output Techniques, Programmed Input /Output, Interrupt-Driven Input /Output, Interrupt-Processing, DMA (Direct Memory Access) Input Output Processors, External Communication Interfaces

Unit IV : Secondary Storage Techniques Secondary Storage Systems, Hard Drives & Its Characteristics, Partitioning & Formatting: FAT, Inode, Drive Cache, Hard Drive Interface: IDE, SCSI, EIDE, Ultra DMA & ATA/ 66, Removable Drives, Floppy Drives, CD-ROM & DVD-ROM, Removable Storage Options, Zip, Jaz & Other Cartridge Drives, Recordable CDs & DVDs, CD-R vs CDRW, Tape Backup

Unit V : I/O Technology Keyboard, Mouse, Video Cards, Monitors, Liquid Crystal Displays (LCD), Digital Camera, Sound Cards, Printers , Classification of Printers, Modems, Scanners, Scanning Tips, Power Supply, SMPS (Switched Mode Power Supply)

Unit VI : Instruction Set Architecture Instruction Set Characteristics, Instruction Set Design Considerations, Operand Data Types, Types of Instructions, Number of Addresses in an Instruction, Addressing Schemes, Types of Addressing Schemes, Immediate Addressing, Direct Addressing, Indirect Addressing, Register Addressing, Register Indirect Addressing, Indexed Addressing Scheme, Base Register Addressing, Relative Addressing Scheme, Stack Addressing, Instruction Set and Format Design Issues, Instruction Length, Allocation of Bits Among Opcode and Operand, Variable Length of Instructions, Example of Instruction Format

Unit VII : Registers, Micro-Operations and Instruction Execution Basic CPU Structure, Register Organization, Programmer Visible Registers, Status and Control Registers, General Registers in a Processor, Micro-operation Concepts, Register Transfer Micro-operations, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Instruction Execution and Micro-operations, Instruction Pipelining

Unit VIII : ALU Organisation ALU Organisation, A Simple ALU Organization, A Sample ALU Design, Arithmetic Processors.

Unit IX : The Control Unit The Control Unit, The Hardwired Control, Wilkes Control, The Micro-Programmed Control, The Micro-Instructions, Types of Micro-Instructions, Control Memory Organisation, Micro-Instruction Formats, The Execution of Micro-Program.

Unit X : Reduced Instruction Set Computer Architecture Introduction to RISC, RISC Architecture, The Use of Large Register File, Comments on RISC, RISC Pipelining.

Referential Books:

1. V. C. Hamacher, Z.G. Vranesic, S.G. Zaky „Computer Orgaization, Mc. Graw H. International.
2. M. Mano, Computer System Architecture, Phi
3. J. P. Hayes, Computer Architecture And Organization, Mc. Graw Hill – International
4. V. Rajaraman : Fundamentals Of Computers, Prentice Hall Of India. (Third Edition)
5. P.K. Sinha: Computer Fundamentals, Bpb Publications
6. D.P. Curlin: K. Foley, K Sen And C. Morin: Information Technology, Mc Graw Hill Edition.
7. Roger Hunt And John Shelly: Computer And Commonsense, Prentice Hall Of India
8. J.P. Hayes: Computer Architecture And Organization) Mc. Graw Hill International Edition)
9. Fundamental Of Computers – By V.Rajaraman B.P.B. Publications
10. Fundamental Of Computers – By P.K. Sinha
11. Computer Today- By Suresh Basandra
12. Unix Concepts And Application – By Sumitabha Das
13. Ms-Office 2000(For Windows) – By Steve Sagman
14. Computer Networks – By Tennenbum Tata Macgrow Hill Publication
15. "Computers Today", D. H. Sanders, Fourth Edition, Mcgraw Hill, 1988.

16. "Fundamentals Of Computers", V. Rajaraman, Second Edition, Prentice Hall Of India, New Delhi, 1996.
17. Information Technology", Satish Jain, Paperback Edition, BPB 1999.
18. Information Technology inside and outside", David Cyganski, John A. Orr, Paperback Edition, Pearson Education 2002.
19. Computer Fundamentals", B. Ram, Third Edition, Wiley, 1997.
20. Fundamentals of Information Technology", Chetan Srivastva, Third Edition, Kalayani Publishers
21. Computers, Larry Long & Nancy Long, Twelfth Edition, Prentice Hall

Programming in 'C'

Unit I : Problem Solving Problem-Solving Techniques, Steps for Problem-Solving, Using Computer as a Problem Solving Tool, Design of Algorithms, Definition, Features of Algorithm, Criteria to be followed by an Algorithm, Top Down Design, Analysis of Algorithm Efficiency, Analysis of Algorithm Complexity, Flowcharts, Basic Symbols used in Flowchart Design

Unit II : Basics of C What is a Program and what is a Programming Language? C Language, History of C, Salient Features of C, Structure of a C Program, A Simple C Program, Writing a C Program, Compiling a C Program, Link and Run the C Program, Run the C Program through the Menu, Run from an Executable File, Linker Errors, Logical and Runtime Errors, Diagrammatic Representation of Program, Execution Process

Unit III : Variables and Constants Character Set, Identifiers and Keywords, Rules for Forming Identifiers, Keywords, Data Types and Storage, Data Type Qualifiers, Variables, Declaring Variables, Initialising Variables, Constants, Types of Constants

Unit IV : Expressions and Operators Assignment Statements, Arithmetic Operators, Relational Operators, Logical Operators, Comma and Conditional Operators, Type Cast Operator, Size of Operator, C Shorthand, Priority of Operators

Unit V : Decision and Loop Control Statements Decision Control Statements, The if Statement, The switch Statement, Loop Control Statements, The while Loop, The do-while Statement, The for Loop, The Nested Loop, The Goto Statement, The Break Statement, The Continue Statement

Unit VI : Arrays Array Declaration, Syntax of Array Declaration, Size Specification , Array Initialization, Initialization of Array Elements in the Declaration, Character Array Initialization, Subscript, Processing the Arrays, Multi-Dimensional Arrays, Multi-Dimensional Array Declaration, Initialization of Two-Dimensional Arrays

Unit VII : Strings Declaration and Initialization of Strings, Display of Strings Using Different Formatting Techniques, Array of Strings, Built-in String Functions and Applications, Strlen Function, Strcpy Function, Strcmp Function, Strcat Function, Strlwr Function, Strrev Function, Strspn Function, Other String Functions

Unit VII : Functions Definition of a Function, Declaration of a Function, Function Prototypes, The Return Statement, Types of Variables and Storage Classes, Automatic Variables, External Variables, Static Variables, Register Variables, Types of Function Invoking, Call by Value, Recursion

Unit IX : Structures and Unions Declaration of Structures, Accessing the Members of a Structure, Initializing Structures, Structures as Function

Arguments, Structures and Arrays, Unions, Initializing an Union, Accessing the Members of an Union

Unit X : Pointers Pointers and their Characteristics, Address and Indirection Operators, Pointer Type Declaration and Assignment, Pointer Arithmetic, Passing Pointers to Functions, A Function Returning More than One Value, Function Returning a Pointer, Arrays and Pointers, Array of Pointers, Pointers and Strings

Unit XI : The C Preprocessor # define to Implement Constants, # define to Create Functional Macros, Reading from Other Files using # include ,Conditional Selection of Code using #ifdef, Using #ifdef for different computer types Using #ifdef to temporarily remove program statements, Other Preprocessor Commands, Predefined Names Defined by Preprocessor, Macros Vs Functions

Unit XII : Files File Handling in C Using File Pointers, Open a file using the function fopen (), Close a file using the function fclose (), Input and Output using file pointers, Character Input and Output in Files, String Input / Output Functions, Formatted Input / Output Functions, Block Input / Output Functions, Sequential Vs Random Access Files, Positioning the File Pointer, The Unbuffered I/O - The UNIX like File Routines

Referential Books

1. Let us C-Yashwant Kanetkar.
2. Programming in C- Balguruswamy
3. The C programming Lang., Pearson Ecl – Dennis Ritchie
4. Pointers in C – Yashwant Kanetkar
5. How to solve it by Computer – R. G. Dromy
6. Programming in C by Reema Thareja (Oxford)
7. Programming With C, Gottfried, TMH

8. The C Answer Book, Tondo, PHI
9. Programming & Problem Solving Through C Language, EXCEL BOOKS
10. Practical C Programming, O'Qualline, SPD/O'REILLY
11. A First Course in Programming with C, Jeyapoovan, VIKAS

COMPUTER PRACTICALS

Windows Operating Environment , Word Processors Ms Word, MS-Excel, MS - PowerPoint

Paper II

Full Marks – 100

(Theory – 75 Practical -25)

Introduction to Algorithm

Unit I : Basics of an Algorithm Definition and Example of an algorithm, Characteristics of an algorithm, Steps in Designing of Algorithms, Growth of function, Recurrence, Problem Formulation (Tower of Hanoi), Substitution Method, Iteration Method, Master Method

Unit II : Asymptotic Bounds Asymptotic Notations, Concept of efficiency of analysis of an algorithm Comparative efficiencies of algorithms: Linear, Quadratic, Polynomial and Exponential Unit 3 : Analysis of simple Algorithms Euclid's algorithm for GCD, Horner's Rule for polynomial evaluation, Simple Matrix ($n \times n$) Multiplication, Exponent evaluation e.g. a^n , Searching, Linear Search, Sorting, Bubble sort, Insertion Sort, Selection sort.

Unit III : Greedy Technique Elements of Greedy strategy, Activity Selection Problem , Continuous Knapsack Problem, Coin changing Problem, More Examples

Unit IV : Divide and Conquer Approach General Issues in Divide and Conquer, Binary Search, Merge Sort, Quick Sort, Integer Multiplication, More Examples

Unit V : Graph Algorithm Representation of Graphs, Adjacency Matrix, Adjacency List, Depth First Search and Examples, Breadth First Search and Examples

Introduction to Digital Circuits

UNIT I : The Basic Computer The von Neumann Architecture, Instruction Execution: An Example, Instruction Cycle Interrupts, Interrupts and Instruction Cycle, Computers: Then and Now, The Beginning, First Generation Computers, Second Generation Computers, Third Generation Computers, Later Generations

Unit II : The Data Representation Data Representation, Number Systems(Decimal, octal, binary and hexadecimal), Conversion from one number system to another. Addition and subtraction of numbers in these systems, fixed and floating point arithmetic, BCD, EBCDIC, ASCII, Excess-3, Gray Code, Decimal Representation in Computers, Alphabetic Representation, Data Representation for Computation, Error Detection and Correction Codes

Unit III : Principles of Logic Circuits I Logic Gates, Logic Circuits, Combinational Circuits, Canonical and Standard Forms, Minimization of Gates, Design of Combinational Circuits, Examples of Logic Combinational Circuits, Adders, Decoders, Multiplexer, Encoder, Programmable Logic Array, Read Only Memory ROM

Unit IV : Principles of Logic Circuits II Sequential Circuits: The Definition, Flip Flops, Basic Flip-Flops, Excitation Tables, Master Slave Flip Flops, Edge Triggered Flip-flops, Sequential Circuit Design, Examples of Sequential Circuits, Registers,

Counters – Asynchronous Counters, Synchronous Counters, RAM, Design of a Sample Counter

Reference Books:

1. Fundamentals of Digital Circuits, Anand Kumar, PHI
2. Digital Electronics, Tokheim, TMH
3. Digital Electronics, S. Rangnekar, ISTE/EXCEL

Operating System and Linux

Unit I : Introduction, What is an operating system, Simple Batch Systems, Multi-programmed Batch systems, Time- Sharing Systems, Personal – Computer Systems, Parallel systems, Distributed systems, Real- Time Systems. Memory Management: Background, Logical versus physical Address space, swapping, Contiguous allocation, Paging, Segmentation Virtual Memory: Demand Paging, Page Replacement, Page- replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations

Unit II: Processes: Process Concept, Process Scheduling, Operation on Processes CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple – Processor Scheduling. Process Synchronization: Background, The Critical – Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization

Unit III: Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

Unit IV: Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Input or Output Devices, Storage

Devices, Buffering, Secondary Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap- Space Management, Disk Reliability

Unit V: Information Management: Introduction, A Simple File system, General Model of a File System, Symbolic File System, Basic File System, Access Control Verification, Logical File System, Physical File system File – System Interface; File Concept, Access Methods, Directory Structure, Protection, Consistency Semantics File – System Implementation: File – System Structure, Allocation Methods, Free- Space Management

UNIT VI: What Is Linux? -The Problems with Windows -The Benefits of Linux – Proprietary, Software and the GPL- GNU and Linux Together- Different Flavors of Linux- Who Uses Linux?- Understanding How Linux Differs from Windows- Using Ubuntu

UNIT VII: What Is the BASH Shell? -Working with Files-Listing Files-Copying Files and Directories -Moving Files and Directories -Deleting Files and Directories -Changing and Creating Directories-Real Files and Virtual Files. -Users and File Permissions - The File System Explained -File Searches -Using the find Command -Using the locate Command -Using the where is Command-File Size and Free Space -Viewing File Sizes -Finding Out the Amount of Free Space.

Referential Books:

1. Silberschatz and Galvin, " Operating System Concepts", Person, 5th Ed. 2001
2. Madnick E., Donovan J., " Operating Systems:,Tata McGraw Hill,2001
3. Tannenbaum, "Operating Systems", PHI, 4th Edition, 2000
4. An Introduction to Operating System, Dietel, Addison Wesley

5. Operating System, Madnick S.E., Donovan J.J., McGraw Hill
 6. William Stallings, Operating System, PHI
 7. System Programming and Operating Systems, D.M.Dhamdhare, Tata McGraw Hill, 1996
 8. Modern Operating Systems, Tanenbaum A.S., Prentice Hall
- References:
9. Operating System Concepts, Silberschatz, Galvin & Gagne, John Wiley & Sons
 10. Keir Thomas and Andy Channelle with Jaime Sicam (2009), "Beginning Ubuntu Linux" , Apress.(Unit I & II)

B.C.A. (Hons.) Second Year

Paper III

Full Marks – 100

(Theory – 75 Practical -25)

Object Oriented Programming in C++

Unit I: Object Oriented Programming Structured vs. Object Oriented Programming, Object Oriented Programming Concepts, Benefits of Object oriented programming, Object Oriented Languages.

Unit II: Introduction to C++ Genesis of C++, Structure of a C++ program, Data Types, Operators and Control Structures.

Unit III: Objects and Classes Classification, Defining Classes, Encapsulation, Instantiating Objects, Member Functions, Accessibility labels, Static Members.

Unit IV: Constructors and Destructors Purpose of Constructors, Default Constructor, Parameterized Constructors, Copy Constructor, Destructor, Memory Management.

Unit V: Inheritance Concept of Reusability, Types of Inheritance, Single and Multiple Inheritance, Multilevel Inheritance.

Unit VI: Operator Overloading Function and Operator Overloading, Overloading Unary and Binary Operators.

Unit VII: Polymorphism and Virtual Function Abstract Class, Function Overriding, Dynamic Binding, Pure Virtual Functions.

Unit VIII: Streams and Files Stream Classes, Types of I/O, Formatting Outputs, File Pointers, Buffer.

Unit IX: Templates and STL Function and Class Templates, Use of Templates, Standard Template Library.

Unit X: Exception Handling Exceptions in C++ Programs, Try and Catch Expressions, Exceptions with arguments

Concepts of Communication and Networking

Unit I : Basics of Data Communication Concept of communication system, Analog and Digital Communication, Data communication modes, Synchronous and asynchronous transmission, Simplex, half-duplex, full duplex communication ,Networking Protocols and Standards, Layering, OSI reference model, encapsulation, End-to-end argument. Protocol design issues, Applications.

Unit II: Modulation and Encoding Analog Modulation (AM, FM, PM), AM Demodulation (one technique only), Advantages and Disadvantages of each., Analog to Digital (Digitization), Sampling, Quantization, Digital to Analog., Digital Modulation (ASK, FSK, PSK, QPSK)

Unit III: Multiplexing and Switching Concept, FDM, TDM, SDM, Multiplexing Applications, Circuit and Packet Switching

Unit IV: Communication Mediums Digital data transmission, Serial and Parallel Transmission, Guided and Unguided mediums, Wireless Communication, Coaxial Cables, Twisted Pair Cables, Fiber Optic Cables, Connectors

Unit V: Network Classifications and Topologies Network Concept, LAN overview, LAN Topologies, LAN access methods, Network Types based on size like PAN, LAN, MAN, WAN, Functional Classification of Networks, Peer to Peer, Client Server. Wide Area Network, WAN Topologies, WAN Access Methods.

Unit VI: OSI and TCP/IP Models Introduction of OSI Model, Need of such Models, Basic functions of each OSI layer, Introduction to TCP/IP, Comparisons with TCP/IP layers. (At the beginner's level)

Unit VII: Physical and Data link Layer Error detection and correction, CRC, Framing, Retransmission strategies, Multi-access communication, CSMA/CD, Ethernet, Addressing, ARP and RARP.

Unit VIII: Internetworking Devices Network Interface Cards, Modems, Repeaters, Hubs, Bridges, Switch (L2 and L3 differences) and gateways

Unit IX: Network Layer Circuit and packet switching, Routing, Congestion control, Routing protocols: distance vector vs link-state routing, DV problems, Network Addressing, Forwarding, Fragmentation, Error Messaging Services.

Unit X: Transport Layer Addressing and multiplexing, Flow control, congestion control, data transport, Port numbers, service models, Intro to reliability, QoS.

Unit XI: Application Layer DNS, Remote Logging, File transfer, Network Management, client-server applications, WWW, E-mail, MIME

Unit XII: Network Applications Internet Applications like emails, chatting, social networking, Rail Reservations, Information Sharing, e-governance, Online Processing and Collaborations, etc. ,Mobile Applications

Unit XIII: Building a Simple Network Examples of designing the developing small networks, Structure Cabling, Integrating home computers and devices, creating a small Networking

Unit XIV: Introduction to Network Architectures X.25, Frame relay, Telephone network, ATM network, ISP, IPv4 and IPv6 overview

Unit XV: Introduction to Wireless and Mobile Networks Introduction to wireless communication systems, modern wireless communication systems and generations, Introduction to cellular mobile systems, CDMA, cellular system design fundamentals.

Unit XVI: Network Security Introduction to computer security, Security services, Authentication and Privacy, Block and Stream Ciphers, Public and Private key Cryptography, Introduction to RSA, MD5 and DES at the beginner"s level.

Paper IV

Full Marks – 100

(Theory – 75 Practical -25)

Database Management Systems

Unit I: The Basic Concepts Need for a Database Management System, The file based system, Limitations of file based system, The Database Approach, The Logical DBMS Architecture, Three level architecture of DBMS or logical DBMS architecture, Mappings between levels and data independence, The need for three level architecture, Physical DBMS Architecture, DML Precompiler, DDL

Compiler, File Manager, Database Manager, Query Processor, Database Administrator, Data files indices and Data Dictionary, Commercial Database Architecture, Data Models

Unit II: Relational and ER Models The Relational Model, Domains, Attributes, Tuple and Relation, Super keys Candidate keys and Primary keys for the Relations, Relational Constraints, Domain Constraint, Key Constraint, Integrity Constraint, Update Operations and Dealing with Constraint Violations, Relational Algebra, Basic Set Operation, Cartesian Product, Relational Operations, Entity Relationship (ER) Model, Entities, Attributes, Relationships, More about Entities and Relationships, Defining Relationship for College Database, E-R Diagram, Conversion of E-R Diagram to Relational Database

Unit III: Database Integrity and Normalisation Relational Database Integrity, The Keys, Referential Integrity, Entity Integrity, Redundancy and Associated Problems, Single-Valued Dependencies, Single-Valued Normalisation, The First Normal Form, The Second Normal Form, The Third Normal Form, Boyce Codd Normal Form, Desirable Properties of Decomposition, Attribute Preservation, Lossless-join Decomposition, Dependency Preservation, Lack of redundancy, Rules of Data Normalisation, Eliminate Repeating Groups, Eliminate Redundant Data, Eliminate Columns Not Dependent on Key.

Unit IV: File Organisation in DBMS Physical Database Design Issues, Storage of Database on Hard Disks, File Organisation and Its Types, Heap files (Unordered files), Sequential File Organisation, Indexed (Indexed Sequential) File Organisation, Hashed File Organisation, Types of Indexes, Index and Tree Structure, Multi-key File Organisation, Need for Multiple Access Paths, Multi-list

File Organisation, Inverted File Organisation, Importance of File Organisation in Databases

Unit V: The Structures Query Language What is SQL? Data Definition Language, Data Manipulation Language, Data Control, Database Objects: Views, Sequences, Indexes and Synonyms, Table Handling, Nested Queries

Unit VI: Transactions and Concurrency Management The Transactions, The Concurrent Transactions, The Locking Protocol, Serialisable Schedules, Locks Two Phase Locking (2PL), Deadlock and its Prevention, Optimistic Concurrency Control.

Unit VII: Database Recovery and Security What is Recovery? Kinds of failures, Failure controlling methods, Database errors, Recovery Techniques, Security & Integrity, Relationship between Security and Integrity, Difference between Operating System and Database Security, Authorization

Unit VIII: Distributed and Client Server Databases Need for Distributed Database Systems, Structure of Distributed Database, Advantages and Disadvantages of DDBMS, Advantages of Data Distribution, Disadvantages of Data Distribution, Design of Distributed Databases, Data Replication, Data Fragmentation, Client Server Databases, Emergence of Client Server Architecture, Need for Client Server Computing, Structure of Client Server Systems, Advantages of Client Server Systems.

System Analysis and Designing

Unit I: Introduction to SAD Fundamentals of System, Important Terms related to Systems, Classification of Systems, Real Life Business Subsystems, Real Time Systems, Distributed Systems, Development of a successful System, Various

Approaches for development of Information Systems Structured Analysis and Design Approach, Prototype, Joint Application Development. 29

Unit II: Systems Analyst – A Profession Why do Businesses need Systems Analysts? Users, Analysts in various functional areas, Systems Analyst in Traditional Business, Systems Analyst in Modern Business, Role of a Systems Analyst Duties of a Systems Analyst, Qualifications of a Systems Analyst, Analytical Skills, Technical Skills, Management Skills, Interpersonal Skills

Unit III: Process of System Development Systems Development Life Cycle, Phases of SDLC, Project Identification and Selection, Project Initiation and planning, Analysis, Logical Design, Physical Design, Implementation, Maintenance, Product of SDLC Phases, Approaches to Development, Prototyping, Joint Application Design, Participatory Design, Case Study

Unit IV: Introduction to Documentation of Systems Concepts and process of Documentation, Types of Documentation, System Requirements Specification, System Design Specification, Test Design Document, User Manual, Different Standard for Documentation, Documentation and Quality of Software, Good Practices for Documentation **BLOCK 2: Planning and Designing Systems**

Unit V: Process of System Planning Fact finding Techniques, Interviews, Group Discussion, Site Visits, Presentations, Questionnaires, Issues involved in Feasibility Study, Technical Feasibility, Operational Feasibility, Economic Feasibility, Legal Feasibility, Cost Benefit Analysis, Preparing Schedule, Gathering Requirements of System, Joint Application Development, Prototyping

Unit VI: Modular and Structured Design Design Principles, Top Down Design, Bottom Up Design, Structure Charts, Modularity, Goals of Design, Coupling, Cohesion

Unit VII: System Design and Modelling Logical and Physical Design, Process Modeling, Data Flow Diagrams, Data Modeling, E-R Diagrams, Process Specification Tools, Decision Tables, Decision Trees, Notation Structured English, Data Dictionary BLOCK 3: More Design Issues and CASE Tools

Unit VIII: Forms and Reports Design Forms, Importance of Forms, Reports, Importance of Reports, Differences between Forms and Reports, Process of Designing Forms and Reports, Deliverables and Outcomes, Design Specifications, Narrative Overviews, Sample Design, Testing and Usability Assessment, Types of Information, Internal Information, External Information, Turnaround Document, General Formatting Guidelines, Meaningful Titles, Meaningful Information, Balanced Layout, Easy Navigation, Guidelines for Displaying Contents, Highlight Information, Using Colour, Displaying Text, Designing Tables and Lists, Criteria for Form Design, Organization, Consistency, Completeness, Flexible Entry, Economy, Criteria for Report Design, Relevance, Accuracy, Clarity, Timeliness, Cost

Unit IX: Physical File Design and Database Design Introduction to Database design, Flat files vs. Database, Steps in Database Design, ER model to Database Design, Inputs to Physical Database Design, Guidelines for Database Design, Design of Data Base Fields, Types of Fields, Rules for Naming Tables and Fields, Design of Physical Records, Design of Physical Files, Types of Files, File Organization, Design of Database, Case Study 30

Unit X: CASE Tools for Systems Development Use of CASE tools by organizations, Definition of CASE Tools, Use of CASE tools by Organizations, Role of CASE Tools, Advantages of CASE Tools, Disadvantages of CASE Tools, Components of CASE, Types of CASE Tools, Classification of CASE Tools, Reverse

and Forward Engineering, Visual and Emerging CASE tools, Traditional systems development and CASE based systems development, CASE environment, Emerging CASE Tools, Objected oriented CASE tools, Creating documentation and reports using CASE tools, Creating and executable prototype using Object Oriented CASE tools, Sequence Diagrams BLOCK 4: Implementation and Security of Systems & MIS

Unit XI: Implementation and Maintenance of Systems Implementation of Systems, Conducting System Tests, Preparing Conversion Plan, Installing Databases, Training the end users, Preparation of User Manual, Converting to the new System, Maintenance of Systems, Different Maintenance activities, Issues involved in Maintenance

Unit XII: Audit and Security of Computer Systems Definition of Audit, Objectives of Audit, Responsibility and Authority of the System Auditor, Confidentiality, Audit Planning, Audit of Transactions on Computer, Transaction Audit, Audit of Computer Security, Audit of Application, Benefits of Audit, Computer Assisted Audit Techniques, Audit Software, Test Data, Audit Expert Systems, Audit Trail, Computer System and Security issues, Analysis of Threats and Risks, Recovering from Disasters, Planning the contingencies, Viruses, Concurrent Audit Techniques, Need for Concurrent Audit, Techniques, An Integrated Test Facility, Techniques, The Snapshot Techniques, SCARF, Continuous and Intermittent, Simulation Technique

Unit XIII: Management Information Systems Role of MIS in an organization, Different kinds of Information Systems, Transaction Processing System, Management Information System, Decision Support System, Expert System

Data Structures using 'C'

Unit I : Analysis of Algorithms Mathematical Background, Process of Analysis, Calculation of Storage Complexity, Calculation of Run Time Complexity

Unit II : Arrays Arrays and Pointers, Sparse Matrices, Polynomials, Representation of Arrays, Row Major Representation, Column Major Representation, Applications

Unit III : Lists Abstract Data Type-List, Array Implementation of Lists, Linked Lists-Implementation, Doubly Linked Lists-Implementation, Circularly Linked Lists-Implementation, Applications BLOCK 2: Stacks, Queues and Trees

Unit IV : Stacks Abstract Data Type-Stack, Implementation of Stack, Implementation of Stack using Arrays, Implementation of Stack using Linked Lists, Algorithmic Implementation of Multiple Stacks, Applications

Unit V : Queues Abstract Data Type-Queue, Implementation of Queue, Array Implementation, Linked List Implementation, Implementation of Multiple Queues, Implementation of Circular Queues, Array Implementation, Linked List Implementation of a circular queue, Implementation of DEQUEUE, Array Implementation of a dequeue, Linked List Implementation of a dequeue

Unit VI : Trees Abstract Data Type-Tree, Implementation of Tree, Tree Traversals, Binary Trees, Implementation of Binary Tree, Binary Tree Traversals, Recursive Implementation of Binary Tree Traversals, Non Recursive Implementations of Binary Tree Traversals, Applications

Unit VII : Advanced Trees Binary Search Trees, Traversing a Binary Search Trees, Insertion of a node into a Binary Search Tree, Deletion of a node from a Binary Search Tree, AVL Trees, Insertion of a node into an AVL Tree, Deletion of a node from and AVL Tree, AVL tree rotations, Applications of AVL Trees, B-Trees, Operations on B-Trees , Applications of B-Trees

Unit VIII : Graphs Definitions, Shortest Path Algorithms, Dijkstra's Algorithm, Graphs with Negative Edge costs, Acyclic Graphs, All Pairs Shortest Paths Algorithm, Minimum cost Spanning Trees, Kruskal's Algorithm, Prim's Algorithm, Applications, Breadth First Search , Depth First Search, Finding Strongly Connected Components

Unit IX : Searching Linear Search, Binary Search, Applications

Unit X : Sorting Internal Sorting, Insertion Sort, Bubble Sort, Quick Sort, 2-way Merge Sort, Heap Sort, Sorting on Several Keys 32

Unit XI : Advanced Data Structures Splay Trees, Splaying steps, Splaying Algorithm, Red-Black trees, Properties of a RedBlack tree, Insertion into a Red-Black tree, Deletion from a Red-Black tree, AA-Trees

Unit XII : File Structures Terminology, File Organisation, Sequential Files, Structure, Operations, Disadvantages, Areas of use, Direct File Organisation, Indexed Sequential File Organisation

B.C.A. (Hons.) Third Year

Paper V

Full Marks – 100

(Theory – 75 Practical -25)

Windows Programming using Visual Basic

Unit I: Introduction a. Windows Concepts b. Objects and events c. Define design and development process d. Identify elements of IDE e. Write, run, save, and print a project f. Use online Help

Unit II: Introduce controls and their properties a. Text boxes, group boxes, check boxes, radio buttons, picture boxes and naming conventions b. User

friendly features: access keys, default and cancel buttons, tab sequence, Tool Tips, resetting focus c. Changing properties at run-time d. Concatenate strings

Unit III: Variables, constants and calculations a. Declaration of variables and constants considering data types and scope b. Explicit data type conversions c. Perform calculations using arithmetic operators and order of operations d. Use of accumulators and counters e. Use formatting functions to format output

Unit IV: Decisions and conditions a. Use If statements to control the flow of logic b. Use And and/or operators c. Call event procedures d. Input validation e. Debug tools - set break points, stepping and observation of intermediate results

Unit V: Arrays a. Declare arrays and refer to elements using subscripts b. Use For Each/Next statements c. Structure Variables d. Store data in multidimensional array

Unit VI: Lists, Loops, and Printing a. Create and use list boxes and combo boxes b. Use Do/Loops and For/Next statements c. Send information to the printer

Unit VII: Menus, procedures and functions a. Create menus and submenus for program control b. Write reusable code in sub procedures and sub functions

Unit VIII: Toolbars and Status bar a. Creating toolbars b. Adding images to toolbars c. Writing code to work with toolbars d. Creating and using a status bar e. Adding panels to the status bar

Unit IX: Other controls a. TabControl b. MonthCalendar and Date/TimePicker c. Common Dialog (Open/SaveFile) d. ProgressBar

Unit X: File handling and file controls In VB a. Database Connectivity b. Data base basics & database engine c. Create a database in Access Through VB d. The

nature of a relational databases e. The data controls (DAO and ADO) f. Data Bound controls g. Working with database objects in code h. Data Manipulation through VB – Forms i. Develop a database application

Unit XI: Multiple Document Interface (MDI) a. Overview of MDI b. Creating parent and child forms c. Writing code for parent and child forms d. Child window management e. Creating applications

Unit XII: Creating and using reports a. Printing with windows forms b. Data reports c. Using Crystal Reports

Unit XIII: Create Object-Oriented programs a. OO terminology b. Multi-tier applications c. Classes d. Constructors and Destructors e. Inheritance

Unit XIV: Deploying the project a. Creating setup program b. Help file c. Online registration

E-Commerce

Unit I : Introduction to E-Commerce: The Scope of Electronic Commerce, Definition of Electronic Commerce, Electronic E-commerce and the Trade Cycle, Electronic Markets, Electronic Data Interchange, Internet Commerce, E-Commerce in Perspective. Business Strategy in an Electronic Age: Supply Chains, Porter's Value Chain Model, Inter Organizational Value Chains, Competitive Strategy, Porter's Model, First Mover Advantage Sustainable Competitive Advantage, Competitive Advantage using E-Commerce, Business Strategy, Introduction to Business Strategy, Strategic Implications of IT, Technology, Business Environment, Business Capability, Exiting Business Strategy, Strategy Formulation & Implementation Planning, E-Commerce Implementation, E-Commerce Evaluation.

Unit II: Business-to-Business Electronic Commerce: Characteristics of B2B EC, Models of B2B Ec, Procurement Management Using the Buyer's Internal Marketplace, Just in Time Delivery, Other B2B Models, Auctions and Services from Traditional to Internet Based EDI, Intergration with Back-end Information System, The Role of Software Agents for B2B EC, Electronic marketing in B2B, Solutions of B2B EC, Managerial Issues, Electronic Data Interchange (EDI), EDI: The Nuts and Bolts, EDI & Business.

Unit III: Internet and Extranet : Automotive Network Exchange, The Largest Extranet, Architecture of the Internet, Intranet and Extranet, Intranet software, Applications of Intranets, Intranet Application Case Studies, Considerations in Intranet Deployment, The Extranets, The structures of Extranets, Extranet products & services, Applications of Extranets, Business Models of Extranet Applications, Managerial Issues. Electronic Payment Systems : Is SET a failure, Electronic Payments & Protocols, Security Schemes in Electronic payment systems, Electronic Credit card system on the Internet, Electronic Fund transfer and Debit cards on the Internet, Stored - value Cards and E- Cash, Electronic Check Systems, Prospect of Electronic Payment Systems, Managerial Issues.

Unit IV : Public Policy: From Legal Issues to Privacy : EC- Related Legal Incidents, Legal Incidents, Ethical & Other Public Policy Issues, Protecting Privacy, Protecting Intellectual Property, Free speech, Internet Indecency & Censorship, Taxation & Encryption Policies, Other Legal Issues: Contracts, Gambling & More, Consumer & Seller Protection In EC.

Unit V: Infrastructure For EC : It takes more than Technology, A Network Of Networks, Internet Protocols, Web- Based client/ Server, Internet Security,

selling on the web, Chatting on the Web, Multimedia delivery, Analyzing Web Visits, Managerial Issues.

Referential Books:

1. David Whiteley, " E-Commerce", Tata McGraw Hill, 2000
2. Eframi Turban, Jae Lee, David King, K. Michale Chung, "Electronic Commerce", Pearson Education, 2000

Artificial Intelligence

1. Introduction

Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment.

2. Problem Solving and Searching Techniques

Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

3. Knowledge Representation

Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs

4. Dealing with Uncertainty and Inconsistencies

Truth Maintenance System, Default Reasoning, Probabilistic Reasoning, Bayesian Probabilistic Inference, Possible World Representations.

5. Understanding Natural Languages

Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.

BOOKS RECOMMENDED:

1. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.

2. Russell & Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall, 2 nd edition, 2005.
3. Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2nd edition, 1991.
4. W.F. Clocksin and Mellish, Programming in PROLOG, Narosa Publishing House, 3rd edition, 2001.
5. Ivan Bratko, Prolog Programming for Artificial Intelligence, Addison-Wesley, Pearson Education, 3rd edition, 2000.

Paper VI

Full Marks – 100

(Theory – 75 Practical -25)

Object Oriented Technology and Java

Unit I: Object Oriented Methodology-1 Paradigms of Programming Languages, Evolution of OO Methodology, Basic Concepts of OO Approach, Comparison of Object Oriented and Procedure Oriented Approaches, Benefits of OOPs, Introduction to Common OO Language, Applications of OOPs.

Unit II: Object Oriented Methodology-2 Classes and Objects, Abstraction and Encapsulation, Inheritance, Method Overriding and Polymorphism

Unit III: Java Language Basics Introduction To Java, Basic Features, Java Virtual Machine Concepts, A Simple Java Program, Primitive Data Type And Variables, Java Keywords, Integer and Floating Point Data Type, Character and Boolean Types, Declaring and Initialization Variables, Java Operators 38

Unit IV: Expressions, Statements and Arrays Expressions, Statements, Control Statements, Selection Statements, Iterative Statements, Jump Statements, Arrays

Unit V: Class and Objects Class Fundamentals, Creating objects, Assigning object reference variables, Introducing Methods, Static methods, Constructors,

Overloading constructors, This Keyword, Using Objects as Parameters, Argument passing, Returning objects, Method Overloading, Garbage Collection, The Finalize () Method

Unit VI: Inheritance and Polymorphism Inheritance Basics, Access Control, Multilevel Inheritance, Method Overriding, Abstract Classes, Polymorphism, Final Keyword
Unit 3 : Packages and Interfaces Package, Defining Package, CLASSPATH, Package naming, Accessibility of Packages, Using Package Members, Interfaces, Implementing Interfaces, Interface and Abstract Classes, Extends and Implements Together

Unit VII: Exceptions Handling Exception, Handling of Exception, Using try- catch, Catching Multiple Exceptions, Using finally clause, Types of Exceptions, Throwing Exceptions, Writing Exception Subclasses

Unit VIII: Multithreaded Programming Multithreading: An Introduction, The Main Thread, Java Thread Model, Thread Priorities, Synchronization in Java, Interthread Communication

Unit IX: I/O in Java I/O Basics, Streams and Stream Classes, Byte Stream Classes, Character Stream Classes, The Predefined Streams, Reading from, and Writing to, Console, Reading and Writing Files, The Transient and Volatile Modifiers, Using Instance of Native Methods

Unit X: Strings and Characters Fundamentals of Characters and Strings, The String Class, String Operations, Data Conversion using Value Of () Methods, String Buffer Class and Methods

Unit XI: Exploring Java I/O Java I/O Classes and Interfaces, I/O Stream Classes, Input and Output Stream, Input Stream and Output Stream Hierarchy,

Text Streams, Stream Tokenizer, Serialization, Buffered Stream, Print Stream, Random Access File

Unit XII: Applets The Applet Class, Applet Architecture, An Applet Skeleton: Initialization and Termination, Handling Events, HTML Applet Tag 39

Unit XIII: Graphics and User Interfaces Graphics Contexts and Graphics Objects, Color Control, Fonts, Coordinate System, User Interface Components, Building User Interface with AWT, Swing-based GUI, Layouts and Layout Manager, Container

Unit XIV: Networking Features Socket Overview, Reserved Ports and Proxy Servers, Internet Addressing: Domain Naming Services (DNS), JAVA and the net: URL, TCP/IP Sockets, Datagrams

Unit XV: Advance Java Java Database Connectivity, Establishing A Connection, Transactions with Database, An Overview of RMI Applications, Remote Classes and Interfaces, RMI Architecture, RMI Object Hierarchy, Security, Java Servlets, Servlet Life Cycle, Get and Post Methods, Session Handling, Java Beans

Internet Concepts and Web Design

Unit I : The Internet Classification of Networks, Networking Models, What is Packet Switching, Accessing the Internet, Internet Protocols, Internet Protocol (IP), Transmission Control Protocol (TCP), Internet Address, Structure of Internet Servers Address, Address Space, How does the Internet work, Intranet & Extranet, Internet Infrastructure, Protocols and Services on Internet, Domain Name System, SMTP and Electronic Mail, Http and World Wide Web, Usenet and Newgroups, FTP, Telnet, Internet Tools, Search Engines, Web Browser.

Unit II: Introduction to HTML What Is HTML, Basic Tags of HTML, HTML Tag, TITLE Tag, BODY Tag, Formatting of Text, Headers, Formatting Tags, PRE Tag, FONT Tag, Special Characters, Working with Images, META Tag.

Unit III: Advanced HTML Links, Anchor tag, Lists, Unordered Lists, Ordered Lists, Definition Lists, Tables, TABLE, TR and TD Tags, Cell Spacing and Cell Padding, Colspan and Rowspan, Frames, Frameset, FRAME Tag, NOFRAMES Tag, Forms, FORM and INPUT Tag, Text Box, Radio Button, Checkbox, SELECT Tag and Pull Down Lists, Hidden, Submit and Reset, Some Special Tags, COLGROUP, THREAD, TBODY, TFOOT, _blank, _self, _parent, _top, IFRAME, LABEL, Attribute for

Unit IV: Introduction to JavaScript JavaScript Variables and Data Types, Declaring Variables, Data Types, Statements and Operators, Control Structures, Conditional Statements, Loop Statements, Object-Based Programming, Functions, Executing Deferred Scripts, Objects, Message box in JavaScript, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes, JavaScript with HTML, Events, Event Handlers, Forms, Forms Array

Unit V: Web 2.0 and XHTML What Is Web 2.0? Introduction to Web 2.0 terms: Search, Content Networks, Blogging, Social Networking, Social Media, Rich Internet Applications (RIAs), Web Services, Mashups, Widgets and Gadgets, Introduction to XHTML and WML, Syntactic Differences between HTML and XHTML, Standard XHTML Document Structure, An example of XHTML covering Basic Syntax, Images, Hypertext Links, Lists and Tables, Creation of an XHTML Form, Internal Linking and Meta Elements

Unit VI: Using Style Sheets CSS: Inline Styles, Embedded Style Sheets, Linking External Style Sheets, Style Specification Formats Selector Forms, Colour,

Property Value Forms, Font Properties, List Properties, Alignment of Text, The Box Model, Background Image

Unit VII: Introduction to XML XML Basics, XML Document Structure, XML Namespaces, Document Type Definitions, XML Schemas, Displaying XML Documents

Unit VIII: Programming with JavaScript – DOM and Events The Document Object Model, Element Access in JavaScript, Traversing and Modifying a DOM Tree, DOM Collections and Styles, Events, Examples of Event Handling from Body, Button, Text Box and Password Elements, Dynamic Documents using JavaScript – element moving, visibility, positioning etc., Example program (s), Introduction and example of AJAX

Paper VII

Full Marks 100

Practical 100

Practical

Paper VII

Full Marks 100

Project 100

Project Work

Subsidiary Paper

- Basic Mathematics
- Business Communication

Mathematics

Paper I

SETS , RELATIONS AND FUNCTIONS

Definition of set, Operations on sets, Basic set identities, Principle of Inclusion and Exclusion, De-Morgan's Laws, Cardinality, Difference, Symmetric difference, Cartesian product, Results related to Cartesian products, Relations – Types of relations – Equivalence relation, Matrix representation of a binary relation, Functions – onto, one – one, into, inverse functions, Composition of functions – Inverse of compositions.

GROUP THEORY

Definition of Group, Semigroup, Subgroup, Results on subgroups, Order of an element, Properties – Cyclic groups and related properties, Coset decomposition, Lagrange's theorem and its consequences, Group homomorphism.

Trigonometry:

Trigonometric Ratios of allied angles, Trigonometric ratios of Compound angles or addition and subtraction formulae. Transformation Formulae, Trigonometric ratios of multiple and sub-multiple angles, Inverse Trigonometric functions. trigonometrical ratios of negative and associated angles, trigonometrical ratios of compound angles, multiple and sub multiple angles. Conditional identities involving the angles of a triangle, General solutions of trigonometrical equations. Trigonometrical identities, Properties of triangles, Heights and distances.

MATRICES

Review of fundamentals, Equivalent matrices, Elementary row (column) operations, Rank of a Matrix by reducing it to echelon form, Rank of a matrix by

normal form, Finding the inverse of a matrix, Homogeneous and non - Homogeneous system of equations- Consistency criterion, Characteristic equations - Eigen values, Eigen vectors and properties, Cayley Hamilton theorem (Statement only).

Linear Programming

Introduction, definition and related terminology such as constraints, objective function, optimization. Mathematical Formulation of LPP. Graphical method of solving LPP in two variables. Feasible and infeasible solution (up to three non-trivial constraints).

SEQUENCE, SERIES AND CONVERGENCE

Sequence, Finite and Infinite Sequences, Monotonic Sequence, Bounded Sequence, Limit of a Sequence, Convergence of a Sequence, Series, Partial Sums, Convergent Series, Theorems on Convergence of Series (statement, alternating series, conditional convergent), Leibnitz Test, Limit Comparison Test, Ratio Test, Cauchy's Root Test, Convergence of Binomial and Logarithmic Series, Raabe's Test, Logarithmic Test, Cauchy's Integral Test (without proof)

Three-Dimensional Geometry

Introduction, Distance formula. Direction cosines/ratio of a line passing through two points. Equations of a line in different forms; angle between two lines; Coplanar and skew lines. Distance between skew lines.

Paper II

Discrete Mathematical Structures

Sets, Logic, Direct Proof and Proof by Contrapositive, Proof by Contradiction, Prove or Disprove, Equivalence Relations, Functions, Mathematical Induction,

Cardinalities of Sets. Understanding of the basic ideas of sets and functions, including Boolean combination of sets, and be able to manipulate such expressions, understanding of the standard propositional logic connectives and be able to convert logical expressions into conjunctive and disjunctive normal form, understanding of the universal and existential quantifiers, familiar with the general concept of binary relation, equivalence and order relations and methods of combining relations, standard graphical representations of relations, principle of mathematical induction, inclusion-exclusion principle in simple counting examples, basic ideas of probability. Calculate probabilities in simple experiments.

DIFFERENTIAL CALCULUS

Introduction, Real valued functions, Limit of a function, Algebra of limits, Continuity of a function, Properties of a continuous functions, Differentiability – Differential coefficients of some elementary functions, Algebra of derivatives, Derivatives of some standard functions. Mean value theorems – Roll's theorem, Lagrange's mean value theorem (with Proofs) - Cauchy's mean value theorem, Maclaurin's theorem (statements only). Function of two or more variables, Partial Differentiation, Homogenous Functions Euler's theorem of Homogenous Functions.

INTEGRAL CALCULUS

Definition – Standard results - Methods of integration, Method by substitution – Method by parts. Integral as Limit of Sum, Fundamental Theorem of Calculus(without proof.), Indefinite Integrals, Methods of Integration Substitution, By Parts, Partial Fractions, Reduction Formulae for Trigonometric Functions, Gamma and Beta Functions(definition).

Unit VII: DIFFERENTIAL EQUATIONS

Definition and examples, Order and Degree of differential equations, Solutions of first order first degree differential equations, Variable separable, Equations reducible to variable separable, Linear differential equations, Bernoulli's Differential equations.

MATHEMATICAL LOGIC

Propositions and Truth Values, Connectives and their truth tables, Tautology and Contradiction, Logical Equivalence – Standard Theorems, Problems on negation, Converse, inverse and Contra positive of a Proposition, Open Sentences, Quantifiers, Truth sets, Connectives involving quantifiers, Normal forms, Principal normal forms.

Vector Algebra

Vectors and scalars, magnitude and direction of a vector. Direction cosines/ratio of vectors. Addition of two vectors. Multiplication of a vector by a scalar. Position vector of a point and section formula. Scalar (Dot) product of vectors, Vector (Cross) product of vectors. Scalar triple product and vector triple product.

Reference books

1. E Kreyszig, Advanced Engineering Mathematics, 8th Edition New Delhi, India: Wiley India Pvt. Ltd., 2010.
2. S Narayan and P.K.Mittal, Differential Calculus, Reprint. New Delhi: S.Chand & Company Ltd., 2011.
3. N. P. Bali, Differential Calculus, New edition. New Delhi, India: Laxmi Publications (P) Ltd ,2011.
4. G K Ranganath, Text book of B.Sc., Mathematics, Revised edition, New Delhi, India: S Chand and Co., 2011.

5. G B Thomas and R L Finney, Calculus and Analytical geometry, 10th ed.: Addison – Wesley, 2000.
6. D.S.Chandrasekharaiah, Discrete Mathematical Structures, 2nd Edition, PRISM Book Pvt Ltd., 2009.
7. Tremblay and Manohar, Discrete Mathematical Structures With Application To Computer Science, McGraw Hill Book Company, 2006.
8. A R Vasishtha, Matrices, Eighteenth Edition, S K Rastogi For Krishna Prakashan Media(P) Ltd., 2008.
9. I N Herstein, Topics in Algebra, Second Edition, WILEY-INDIA Pvt. Ltd., 2008.
10. K H Rosen, Discrete Mathematics and Its Applications, 7th Edition, McGraw-Hill Education, 2012.
11. G.K.Ranganath & B.Suryanarayana, A Text Book of B.C.A Mathematics Vol – I and II, S Chand and company, 2002
12. TRUSS, J.K. Discrete Mathematics for Computer Scientists. (ISBN 0-201-175649) 2nd Edition, Addison Wesley 1998.

Basic English

Paper I

Basic Applied Grammar and Usage, the Sentences: Kinds of Sentences; Subject and Predicate.

Parts of Speech: A general introduction of Nouns, Pronouns, Adjectives, Verbs Adverbs, Prepositions, Conjunctions, Interjections. Punctuations. Paragraph Writing

Nouns: Kinds; Singular/Plural; Gender; Possession.

Pronouns: Kinds; Usage.

Adjectives: Kinds; Degrees of Comparison; Usage.

Determiners: Kinds, Usage of Adjectives and Determiners.

Articles: Kinds, Articles and Number System, Articles and Gender System, Omission of Articles, Repetition of Articles.

Verbs: Kinds, Auxiliaries, Principal Auxiliaries, Usage; Be, Have, Do, Modal Auxiliaries: Usage; Can/Could, May/Might, Shall/Should, Will/Would, Ought To; Semi - Modals - Need, Dare, Used To. Non-Finite Verbs: Kinds; Infinitives, Gerund, Participle.

Tenses: Kinds; Usage

Adverbs: Kinds; Formation; Position of Adverbs; Usage.

Prepositions: Kinds; Correct Usage. Agreement of the Verb with the Subject.

Conjunctions: Coordinating Conjunction; Subordinating Conjunction, Interjection; Types.

Interjections: Definition and Types.

Comprehension and Précis Writing: Reading and Listening Comprehension Précis

Writing: Techniques of Précis Writing; Topic Sentences and its Arrangement.

Formal Letter Writing

Paper II

Business Communication

Greetings & Introduction Greetings and Small talk, Company Profiles/Jobs and Responsibilities Business Organisations, Jobs and Responsibilities, Getting Ready for the Job Market and Organising a Portfolio Preparing a Portfolio, Responding

to Advertisements Writing a CV/Resume, Covering Letter, Accepting & Declining Job Offers.

Interviews : Preparing for Interviews Preparing for Interviews, Facing Interviews How to face Interviews, Star Structure, Phone and Walk-in-Interviews How to face Phone Interviews, Group Discussions Essential requirements for GD, How are GD different from Conversation and Debates.

Business Writing: Features of Written & Oral Communication Making a choice, In Company Communication: notices, notes, messages, memos, emails etc., External Communication Types of Letters, faxes, emails, Conventions & Practices., Writing Reports Types of reports – Informative & analytical, Contents & Structures., Writing Proposals Basic Features, Types of proposals 50

Cross Cultural Communication : Communication Across Cultures Culture in Business Communication, Cultural Aspects of behavior at meetings in the US, Cultural Profile of India, Business Travel Preparation for business travel, International travel, do"s and don"t of business travel, how to avoid travel related problems, travel itineraries, making arrangements, Business Events What are business events, the importance of business events, planning for business events, vocabulary associated with business events, polite expressions, writing an e-mail to expo organizers

Reference Books:

- 1) Business Communication – K.K.Sinha – Galgotia Publishing Company, New Delhi.
- 2) Media and Communication Management – C.S. Rayudu – Hikalaya Publishing House, Bombay.
- 3) Essentials of Business Communication – Rajendra Pal and J.S. Korlhalli-Sultan Chand & Sons, New Delhi.