PAPER-III
OPERATING SYSTEM

Unit – I
Introduction to Operating System

What is an Operating System, Operating Systems Architecture, Operating Systems as an Extended Machine & Resource Manager, Process Model, Process States and Transitions, Types of System Calls, System Boot, Multi-Programming, Multi-Tasking, Multi-Threading; Operating Systems Classification: Simple Batch Systems, Multi-programmed Batches systems, Time-Sharing Systems, Parallel & Distributed Operating Systems.

Unit – II
Process Management

Processes: Process Scheduling, Cooperating Processes, Inter-process Communication, Threads, 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, Critical Regions, Monitors, Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Recovery from Deadlock, Combined Approach to Deadlock Handling.

Unit –III
Memory Management

Main Memory Management: Background, Logical versus Physical Address space, swapping, Contiguous allocation, Paging, Segmentation, Segmentation with Paging, Virtual Memory: Demand Paging, Page Replacement, Page replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Demand Segmentation.

Unit –IV
Device and StorageManagement

File-System Interface, Mass-Storage Structure, Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Buffering, Multiple Paths, Secondary-Storage Structure: Disk Structure, Disk Scheduling, Disk Management.

Unit –V
File-System Implementation

A Simple File System, Logical & Physical File System, File-System Interface: Access Methods, Directory Structure, Protection, Free-Space Management, Directory Implementation.

Text Books:
1. Operating System Concepts, Silbersachatz and Galvin, Pearson Education Pub.
2. Operating Systems, Madnick E., Donovan J., Tata McGraw Hill,
3. Operating Systems, A. S. Tannenbaum, PHI

Reference Books:
1. Operating Systems Internals and Design Principle, William Stallings, Prentice Hall Publishers
2. Operating Systems- AConcept-Based Approach, Dhananjay M. Dhamdhere, McGraw-Hill

PAPER IV
DIGITAL ELECTRONICS AND MICROPROCESSOR

Unit – I
Background of Digital Electronics
Digital Signals, Different Type of Numbering Systems: Decimal, Octal, Binary, Hexadecimal, Conversation from one number system to another number system, Binary Math: Binary Addition, Binary Subtraction, Binary Complements, One's & Two's Complement, Binary Subtraction using Two's Complement, Signed Magnitude, Floating Point Binary, IEEE Standard 754 Floating-Point Formats, Logic Gate Basics: NOT Gate, AND Gate, OR Gate, Exclusive-OR (XOR) Gate , Truth Tables for Logic Gates, Truth Tables for Combinational Logic.

Unit – II
Logic Families
Introduction to Semiconductor, Fundamentals of Semiconductor Devices, Diode and Transistor Characteristics, Diode And Transistor As A Switch, Evolution of Logic Gates, Types of Logic Family: Circuit of RTL, DTL, TTL and Working Function as a Gate, Emitter Coupled Logic (ECL), CMOS Logic Family, NMOS and PMOS Logic, Comparison of Different Logic Families.

Unit – III
Boolean Algebra and Karnaugh Maps
Boolean Algebra, Boolean Expressions of Combinational Logic, Laws of Boolean Algebra, Rules of Boolean Algebra: NOT Rule, OR Rules, AND Rules, XOR Rules, Derivation of Other Rules, Simplification, DeMorgan's Theorem, Boolean Expression Formats: Sum-of-Products, Product-of-Sums, Converting SOP & POS to Truth Table & Truth Table to Expression, Karnaugh Maps, Minimization techniques of Boolean Expression using K-Maps, "Don't Care" Conditions, Minimization of Multiple Output Boolean Functions, VEM Theory of K-Map, MEV and Minimization of Two, Three, Four, Five and Six Variable Maps using VEM.

Unit – IV
Combinational and Sequential Circuit
Creation of Different Combinational Circuits using K-Map: Adders, Seven-Segment Displays Circuits, BCD to Gray code Convertor, BCD to Ex-3 code Convertor, BCD to 84-2-1 code converter, Digital Comparator and other Combinational Circuit, Carry Propagation–Look-Ahead Carry Generator, Decoders, Multiplexers, De-multiplexers, State Machine Design Process: Mealy Versus Moore State Machines, S-R Latch/ Flip-Flop, D Latch, J-K Flip-Flop, Divide-By-Two Circuit, Registers, Counter: Ripple (Asynchronous) Counter and Synchronous Counter, UP/DOWN Counters, Design of Synchronous Counter using K-Map.

Unit – V
Fundamentals of Microprocessor
What is Microprocessor, Evolution of Microprocessor, Various Microprocessor Families and Examples, Generic Architecture of Microprocessor, Pin Diagram & Pin Functions of Intel 8085 Microprocessor, Instruction Set for Microprocessor, Definition and Need of Addressing mode, Addressing modes of Intel 8085 & 8086 Microprocessor, Machine Cycle and Instruction Cycle of Microprocessor, Working of Microprocessor.

Text Books:
1. Modern Digital Electronics, R.P. Jain, TMH
2. Digital Principles & Application, Leach & Malvino, TMH
3. Digital Logic Design, Morries Mano, PHI
4. Digital design- Principles and Practices, J. F. Wakerly, Pearson India.
5. Microprocessor - Architecture, Programming and Applications with the 8085", Ramesh S.Gaonkar, PHI.
6. The 8085A Microprocessor software, programming and Architecture, Brarry B.Bray, PHI

Reference Books:
1. Digital Integrated Electronics, H.Taub & D. Shilling, McGraw Hill.
2. Digital Principles & Design, Givone, TMH
3. Digital Circuit & Design, S. Aligahanan, S. Aribazhagan, Bikas Publishing House.
4. Fundamentals of Digital Electronics & Microprocessor, Anokh Singh, A.K. Chhabra, S. Chand
5. Digital circuits and Logic Design, Samuel Lee, PHI publication

PAPER-V
COMPUTER NETWORKS AND CYBER TECHNOLOGY

Unit – I
Introduction to Computer Network and Physical Layer
Computer network Fundamentals and Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, ISO-OSI reference model, TCP/IP model, Concept of Analog & Digital Signal, Bandwidth, Multiplexing: TDM, FDM, WDM, CDMA, Transmission Media : Twisted pair, Coaxial cable, Fiber-optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching ,Packet Switching & their comparisons, Line Coding techniques: Bipolar, Unipolar, RZ, NRZ, Manchester, AMI, B8ZS, Block coding techniques.

Unit –II
Data Link Layer
Functions at Data Link Layer, Framing, Error detection and correction codes: checksum, CRC, hamming code, Flow Control: Stop & Wait and Sliding Window Protocols, Data link protocols: HDLC and PPP, Medium Access Sub-Layer: LLC Protocol, IEEE 802.2, Overview of IEEE 802.3,802.4,802.5, 802.6 and brief knowledge of 802 series up to present scenario.

Unit –III
Network Layer and Transport Layer
Functions of Network Layer, Routing Protocols & Algorithms, Principles of Congestion Control, IPv4 addresses, IPv4 Addressing, IPv6 addresses, Internetworking basics, Functions of Transport Layer, Flow Control & Buffering, Introduction to TCP/UDP protocols and their comparison.

Unit –IV
Common Network Architecture
Protocol Stack for Example Networks, Connection oriented & Connectionless N/Ws, Frame Relay, Example of N/Ws-P2P, X.25, ATM, Ethernet, Wireless LANs - 802.11, 802.11x, Gigabit, Broad Band Networks: Integrated Service Digital Networks (ISDN), Broad Band ISDN, ATM, Introduction to Very Small Aperture Terminal (VSAT).

Unit –V
Application Layer
World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Hyper Text Transfer Protocol (HTTP), Email Protocols: MIME & SMTP, POP, IMAP, Telnet – Remote Communication Protocol, Proxy Server, Proxy Web Servers.

Cyber Laws in India
Information Technology Act, 2000 – a brief overview; E – commerce; E – governance; Concept of Electronic Signature; Concept of Cyber contraventions and Cyber Offences, IT Act, 2000.

Text Books:
1. Computer Networks, Andrew S. Tanenbaum, PHI / Pearson Education Inc.,
2. Data Communication and Networking, Behrouz A. Forouzan, Tata McGraw-Hill.
3. Internet Law-Text and Materials, Chris Reed, Universal Law Publishing Co., New Delhi
4. Hand book of Cyber Laws, Vakul Sharma, Macmillan India Ltd, New Delhi

Reference Books:
1. Data and Computer Communication, William Stallings, Pearson Education.
2. Computer and Communication Networks, Nader F. Mir, Pearson Education, 2007.
3. Data & Computer Communication, Black, PHI.

PAPER-VI
OBJECT ORIENTED PROGRAMMING USING C++

Unit-I
Features of C++, OOP vs. procedure-oriented programming, OOP Concepts: Abstraction, Inheritance, Polymorphism, Data Binding, Encapsulation, Classes, subclasses and Objects; Basics of C++: Data Types and sizes, Variable, Constants and its types, Use of << and >> operators, Operators and Expressions: Operators:-Arithmetic, Relational, Assignment, Logical, Increment and Decrement Operators (++ and --), 'Operate-Assign' Operators (+=, *=, ...); Expressions, Operator Precedence, Precedence and Order of Evaluation, Conditional Expression, Casting and type conversion.

Unit-II
Program Flow & Decision Control: if, if – else, if - else if, Loop Control: while, do – while, for, break, continue, Case Control: switch, goto; Functions/Procedures, Returning values from functions, Arguments Passed by Value, Passing Addresses of Arguments, Pointers and Arrays: Pointer Initialization, Pointer Operators, Pointer Arithmetic, Functions and pointers, Arrays, Initializing Arrays, Passing Arrays to Functions, Pointers and Arrays, Pointer to an Array, Array of pointers, Strings: String I/O, Arrays of Strings, Structures, Arrays of Structures.

Unit-III
Binding Data & Functions: Defining a Class, Creating an Object, Scope, Data Abstraction, Data Encapsulation, 'this' Pointer, Dynamic Creation of Objects, Constructors and Destructors: Parameterized & Copy constructor, Member Functions & Methods, Friend Class and Friendly Functions, Returning Objects, Arrays of Objects.

Unit-IV
Function and Operator Overloading, Rules for Overloading, Operator overloading and its uses: Overloading unary and binary operators, Overloading the Assignment Operator, Overloading the << Operator, Overloading the Increment & Decrement Operator, Converting data types: Basic to class type, Class to Basic Type, Class to Another Class Type.

Unit-V
Reusing Classes: Inheritance-Base and Derived classes, Inheritance types, Scope Resolution Operator, Access Modifiers, Multiple & Multilevel Inheritance, Calling Base Class Constructor, Overriding Base Class Members, Virtual functions and Polymorphism: Virtual & non-virtual Overriding, Rules for Virtual Functions, Pure Virtual Functions, Static and Dynamic Binding, Virtual Base Classes, Templates, Exception Handling, Throwing an exception.

Text books:
1. C++, The Complete Reference, 4th Edition, Herbert Schildt, TMH.
2. Object Oriented Programming in C++, 4th Edition, R.Lafore, SAMS, Pearson Education

Reference Books:
1. An Introduction to OOP, 3rd Edition, T. Budd, Pearson Education,2008.
2. Programming Principles and Practice Using C++, B.Stroutstrup, Addison- Wesley, Pearson Education.
3. Problem solving with C++, 6th Edition, Walter Savitch, Pearson Education,2007..
4. The Art, Philosophy and Science of OOP with C++, R.Miller,SPD.

PAPER-VII
COMPUTER GRAPHICS AND MULTIMEDIA

Unit-I
An Introduction Graphics System

Computer Graphics Fundamentals, Application of Computer Graphics, Video Display Devices, Raster & Random Scan Systems, Input Devices, Graphics Software, Interactive devices, Output Primitives, Line Drawing & Circle Generating Algorithms, Scan-Line Polygon Fill Algorithm, Inside-Outside tests, Boundary-Fill Algorithm, Flood Fill Algorithm.

Unit-II
2D Transformations

2-D Viewing and Clipping: Viewing Transformations, Point Clipping & Line Clipping Algorithms, Polygon Clipping algorithms, 2D Geometric Transformations: Basic transformations (Translation, Rotation, Scaling), Matrix Representation & Homogeneous Coordinates, Composite transformations, Reflection and Shear.

Unit-III
3D transformations

3D Viewing Transformation, Projections: Parallel Projection (Orthographic & Oblique Projections, Isometric Projections), Perspective Projections, 3D Geometric Transformations: Translation, Rotation, Scaling, Matrix Representation, 3D Object Representations: Polygon Surface and Polygon table, Bezier curves and surfaces.

Unit-IV
Multimedia and Photoshop s/w

Fundamentals of Multimedia, Adobe Photoshop CS4: Menus and panels, Exploring the Toolbox, Working with Images: Working with Multiple Images, Rulers, Guides & Grids, Image Size Command, Adjusting Canvas Size & Canvas Rotation, Creating, Selecting, Linking & Deleting Layers, Painting with Selections, Red Eye Tool, Clone Stamp Tool, Color creation, Quick Mask Options, Creating Straight & Curved Paths, Creating Special Effects.

Unit-V
CorelDraw X4

CorelDraw X4 Command Bars & Tools, Drawing Area-Objects-Lines, Working with Text & Artistic Media Tool, Fills & Modifying Outlines, Drop Shadows, Importing and Editing OCR Text, Templates, Drawing and Editing Curves and Lines, Three-point Tools, Clipart, Special Characters and Creating Symbols, Working with Layers & Creating a Master Layer, Brush Tools and Adding Objects, Interactive Tools, PowerClip Feature and the Envelope Tool.

Text Books:
1. Procedural Elements for Computer Graphics, D.F. Rogers, Tata McGraw Hill
2. Fundamentals of Interactive Computer Graphics, J.D. Foley and A.D. Van, Addison-Wesley.
3. How to Do Everything Adobe Photoshop CS4, Chad Perkins, Tata McGraw Hill
4. Corel Draw X4: The Official Guide, (Paperback), Gary David Bouton, Tata McGraw Hill

Reference Books:
1. Photoshop CS4 Quicksteps, Carole Matthews & Gary David Bouton, Tata McGraw Hill
2. CorelDRAW X4 , Deborah Miller, Pearson Education
3. Coreldraw X5 In Simple Steps, Hindi Ed., ISBN : 9789350042885, Kogent, Wiley Publications
4. Mathematical Elements for Computer Graphics,, Rogers and Adam, Tata McGraw Hill.
5. Theory & Problem of Computer Graphics, Plastock, Schaum Series.
6. Computer Graphics, Tosijasu, L.K., Springer-verleg
7. Principles of Interactive Computer Graphics, Newman, Tata McGraw Hill.

LAB-I
PROGRAMMING LAB USING C++

List of Sample Problems/Experiments:

1. Write a C++ program to find the sum of individual digits of a positive integer.
2. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1.Subsequent terms are found by adding the preceding two terms in the sequence.Write a C++ program to generate the first n terms of the sequence.
3. Write a C++ program to generate all the prime numbers between 1 and n , where n is a value supplied by the user.
4. Write C++ programs that use both recursive and non-recursive functions
    a. To find the factorial of a given integer. b. To find the GCD of two given integers.
    c. To find the nth Fibonacci number.
5. Write a C++ program that uses a recursive function for solving Towers of Hanoi problem.
6. Write a C++ program to find both the largest and smallest number in a list of integers.
7. Write a C++ program to implement the matrix ADT using a class. The operations supported by this ADT are:
    a)Reading a matrix. c) Addition of matrices.
    b)Printing a matrix. d) Subtraction of matrices.
    e)Multiplication of matrices.

Note: Practical must be as per syllabus of theoretical paper.