

III Semester

MCA301 COMPUTER GRAPHICS

Module I

Introduction, Overview of Graphics Systems-Display devices, Input devices, Hard-Copy devices, Graphics software, Line Drawing Algorithms-DDA, Bresenham, Parallel line algorithms, Circle Generating Algorithms, Ellipse Generating Algorithms

Module II

Output primitives-Color and Grayscale levels, 2D Transformations-Translation, Rotation, Scaling, Reflection, Shear, Composite Transformations, Two Dimensional viewing- Window-to-view port, Clipping operations- Point, Line, Polygon, Curve, Text clippings

Module III

3D object representations-Polygon surfaces, Polygon tables, Plane equations, Polygon Meshes, Quadric surfaces, Super Quadrics, Blobby objects, Spline representations, Bezier curves and surfaces

Module IV

3D transformations-Translation, Rotation, Scaling, Composite Transformations, 3D viewing- Parallel, Perspective projections, Visible surface detection algorithms-Back Face Detection, Depth-Buffer Method, A-Buffer Method, Scan-line Method, Depth-Sorting method, Area-Subdivision method

Module V

Surface Rendering-light sources, illumination models, OpenGL-Introduction

TEXT BOOKS

1. Donald Hearn and M.Pauline Baker, "Computer Graphics-C Version", Second Edition, Pearson Education,2005
2. Mason Woo, Jackie Neider, Tom Davis, Dave Shreiner , "Open GL –programming Guide", Third Edition, Pearson Education,2003

REFERENCES

1. Foley, Vandam, Feiner, Huges,"Computer Graphics: Principles & Practice", Second edition in C, Pearson Education, 2005
2. Ranjan Parekh, "Principles of Multimedia", ,Tata McgrawHill,2006
3. D.P. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.
4. Hill Jr, "Computer Graphics using openGL",2nd Edition,PHI
5. "Procedural elements of Computer Graphics", Rogers, Mc-Graw Hill.
6. "Mathematical elements of Computer Graphics", Rogers, Mc-Graw Hill.
7. Computer Graphics- A Programming Approach,Steven Harrington,Second Edition,McgrawHill International

MCA 302 -DATABASE MANAGEMENT SYSTEMS

Module I -Introduction To Database Systems and E-R Model

Overview, A Historical Perspective, Files System versus DBMS, Advantages of DBMS, Describing and storing data in a DBMS Transaction management, Structure of a DBMS, People who work with Databases, Overview of Database Design. Entities, Attributes and Entity Sets, Relationships and Relationship sets, Additional Features of E-R Model: Key Constraints. Conceptual Design with the E-R Model, Overview of Unified Modeling Languages

Module II -Relational Model and Query Languages

Introduction to the Relational Model. Integrity Constraints over Relations : Primary Key, Foreign Key and General Constraints. E-R Model to Relational Model: Entity Sets to Tables, Relationship Sets to Tables, Translating, Relationship Sets with Key Constraints. Translating Relationship Sets with Participation Constraints, Translating Weak Entity Sets, Translating Class Hierarchies. Translating E-R Diagrams with Aggregation, Introduction to Query Languages, Relational Algebra: Selection and Projection Operations. Set Operations, Renaming, Joins, Division

Module III- Structured Query Language

Overview of SQL, Basic Queries in SQL, Union, Intersect and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Views in SQL, Embedded SQL and Cursors

Module IV- Relational Database Design

Introduction to Schema Refinement, Functional Dependencies, Properties of Decomposition, Normal Forms: First Normal Form, Second Normal Form, Third Normal Form, Boyce Codd Normal Form, Fourth Normal Form, Fifth Normal Form

Module V -Transaction Management, Concurrency Control and Distributed System

The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions: Serialisability, Anomalies Due to Interleaved Execution . Schedules Involving Aborted Transactions, Lock-Based Concurrency Control: 2 PL – Basic & Strict, Dead Locks, Introduction to Crash Recovery, Concurrency Control:2 PL, Serialisability, and Recover-ability,: Introduction to Locking Management: Dealing with Deadlock .Introduction to ARIES, Introduction to Distributed Databases: Advantages & Disadvantages, Transaction Types – Local & Global Transactions, Distributed DBMS Architectures, Design of Distributed Databases: Replication, Fragmentation

Text Books :

Database Management Systems – Raghu Ramakrishnan and Johannes Gehrke, Third Edition, McGraw Hill, 2003

Reference Books :

1. Database Systems: Design , Implementaion and Management, Peter Rob, Thomson Learning, 7Edn.
2. Concept of Database Management, Pratt, Thomson Learning, 5Edn.
3. Database System Concepts – Silberchatz, Korth and Sudarsan, Fifth Edition, McGraw Hill, 2006
4. The Complete Reference SQL – James R Groff and Paul N Weinberg, Second Edition, Tata McGraw Hill, 2003

MCA 303 - System Software

Module I

General concepts-Review of assembly and machine language programming, distinction between system software and application software.

Assemblers and macros-Assemblers-assembly language statements-Imperative, declaration and assembler directives- Elements of assembly language programming- two pass and one pass assembler-forward reference problem.

Macros-macro definition, macro call, macro expansion, nested macro calls- macro processors

Module II

Linker-Relocation and linking concepts-self relocating programs.

Loader-Types of loaders

Editor-Types of editors-Components of editor-Debug monitor

Module III

Compiler-The phases of a compiler. Passes and reducing the number of passes. High level programming languages

Lexical Analysis-The role of lexical analyzer. Simple approach to the design of lexical analysis-implementation of transition diagram. regular expression. Finite automata-DFA&NFA-conversion from regular expression to NFA and NFA to DFA.

Module IV

The syntactic specification of a programming language- context free grammar derivation and parse tree, unambiguous grammar. Basic parsing technique-Bottom up and Top down parsers, representation of a parse tree. Shift reduce parsing-stack implementation of shift reduce parsing-constructing a parse tree

Module V

Intermediate code generation-postfix notation, syntax tree, three-address code.

Intermediate code optimization-local optimization, loop optimization - loop invariant computation, induction variable elimination, reduction in strength. The DAG representation of basic blocks.

Code generation-object program, runtime addresses for names, problems in code generation, simple code generator.

Text Books:

1.Alfred V Aho & Jeffrey D Ullman, 'Principles of Compiler Design'.

2.D M Dhamdhere, 'Systems Programming & Operating Systems'

Reference Book:

JJ Donovan , 'System Programming'

MCA 304-DATA COMMUNICATIONS & COMPUTER NETWORKS

Module I

Simplified data communications model. Electric signals - continuous and discrete signals, periodic signals, Fourier Series Representation of Periodic Signals, Frequency, Spectrum and Bandwidth. Analog and Digital data transmission - data and signals, analog and digital transmission, their comparison, Digital data rate and band width. Transmission impairments - Attenuation, Delay distortion, Noise, Channel Capacity. Transmission Media :- Guided Transmission Media -Twisted pair wires, Coaxial, Optical fiber. Wireless Transmission - Terrestrial microwave, satellite microwave, broad cast Radio, Infrared.

Module II

Data Encoding - Encoding and modulation Technique, Asynchronous and Synchronous transmission, Line Configurations, full duplex and half duplex transmission. Trunks and multiplexing - FDM, TDM, statistical TDM. Modems, ADSL, xDSL, Spread Spectrum-

Concept, Frequency Hopping, Direct Sequence , CDMA. Circuit switching techniques - Datagram, virtual circuit. Effect of packet size on transmission time. Comparison of circuit switching and packet switching, connection oriented and connectionless services.

Module III

Networking concepts:- Simplified network model. Classification of networks : LAN,MAN,WAN and the internet. Protocols and protocol architecture. The OSI ref. Model, TCP/IP ref. Model its origin, the internet layer, the TCP layer, the application layer. Comparison of the OSI and TCP/IP ref. Models.

Data Link Layer: Need for data link control, Flow control - Stop and wait and sliding window protocols, error detection - parity check, CRC, Error control - Stop and wait ARQ, Go back-N ARQ, HDLC protocol, other data link protocols - LAPB, LAPD, PPP.

Module IV

LAN: -LAN protocol architecture (IEEE - 802 reference model), Topologies - Bus, tree, ring and star. Medium access control and logic link control. LAN systems: Ethernet, token bus-token ring. Ethernet - CSMA/CD and its precursors (pure and slotted ALOHA, CSMA), IEEE 802.3, MAC frame format, Fast Ethernet, Gigabit Ethernet, 10 Gbps Ethernet. Token ring LAN (IEEE 802.5) and frame format, IEEE 802.5 FDDI token ring LAN and frame format. Bridges, Wireless LAN - Technology, IEEE-802.11 Architecture and Services, Medium Access Control, Physical Layer.

Module V

Network Layer: Services of NW layer, Routing in Packet Switching Networks- Characteristics, performance criteria. Routing strategies- Fixed routing, Flooding, Random routing, Adaptive routing, Least cost Algorithms-Dijkstra's Algorithm, Bellman-Ford Algorithm. X.25 Network and Protocols. Frame Relay

Transport Layer: - Connection oriented Transport Mechanisms- for Reliable sequencing Network Services, for unreliable Network Services.

Text Book:

William Stallings, -Data and Computer communications - Prentice Hall of India VIIth Edition.

References:

1. Andrews S. Tanenbaum -Computer Networks, Prentice Hall of India, 4th Edition.
2. Behrouz A Forougan - Data Communications and Networking, 4th ed. McGraw Hill,
3. Youlu Zheng, Shakil, Networks for Computer Scientists and Engineers , Oxford University Press.

MCA 305- SOFTWARE ENGINEERING

Module I - Introduction to Software Engineering

Challenges and approaches. Software development process models – waterfall model, prototyping, iterative, time boxing, Software implementation and management process- inspection, configuration, change management.

Module II - Software Requirement, Architecture and Planning

Problem analysis, requirements specification, functional specification with use case, validation and quality matrix.. Component and connector view, styles for Component and connector view,

evaluating architectures. Planning a software project- effort estimation, scheduling, configuration management, quality, risk and monitoring.

Module III - CASE Tools

Documentation tools, analysis and design tools, programming tools : Integration, Implementation and Testing tools, Maintenance tools: Integrated case Environment.

Specification Phase: Informal specifications, Structured system analysis, entity relationship modeling, finite state machines, petri nets, formal techniques.

Function Oriented design: module level concepts, structured design methodology

Module IV - Object oriented analysis and design phase

Object oriented analysis- class modeling, dynamic modeling, challenges of object oriented analysis. Design phase- Design abstraction, action oriented design, transaction analysis, formal techniques for detailed design, challenges of the design phase

Module V - Implementation, Testing and Maintenance

Coding – programming principles and guidelines, refactoring, verification, complexity metrics.

Testing – Black box testing, white box testing process, defect analysis, reliability estimation.

Maintenance – why maintenance is necessary? , Management of maintenance, challenges of maintenance phase

Text Books

1. An Integrated Approach to Software Engineering- Pankaj Jalote 3rd edition, Narosa Publishing House
2. Object Oriented and Classical Software Engineering – Stephen R Schach 5th Edition, Tata Mc-Graw Hill Publishing Co. Ltd.

Reference Books

1. Software Engineering, a Practitioner's Approach- Roger S Pressman 6th Edition, Tata Mc-Graw Hill Publishing Co. Ltd.
2. Software Engineering – Ian Somerville 6th Edition, Pearson Education
3. Fundamentals of Software Engineering- Ghezzi, Jazayer's and Mandriolli 2nd Edition, PHI
4. Software Engineering principles & Practice- Waman S Jawadkar 2nd Edition, Tata Mc-Graw Hill Publishing Co. Ltd.

MCA 306 - MICROPROCESSORS LAB

1. Programs to get familiarized with Microprocessor Kit.
 - a) Program to implement various addressing modes like Immediate, Direct, Indexed, etc.
 - b) Program to find one's complement of a 16 bit number.
 - c) Program to mask off bits selectively.
 - d) Program to perform addition of 2 16 bit numbers.
 - e) Program to perform division by 8 and multiplication by 16 using shift and rotate instructions.
2. Program to display a message on screen using Code and Data Segment.
3. Programs to perform arithmetic, logic, shift and string instructions.
 - a) Program to display ASCII code and character.
 - b) Program to read password and check the validity of the user.

- c) Program to set and get the system date and time.
 - d) Program to implement delay routine.
 - e) Program to find sum of n numbers.
 - f) Program to implement 32 bit arithmetic operations.
 - g) Program to perform concatenation of 2 strings.
4. Programs to implement modular programming using Stacks, subroutines, macros, etc.
- a) Program to find factorial.
 - b) Program to find nCr.
 - c) Program to find the Fibonacci series.
 - d) Program to implement a 2 digit calculator.
 - e) Program to generate a real time clock.
 - f) Program to perform sorting.
5. Programs for display/video manipulation.
- a) Program to read a string at location (x1,y1) and display at video location (x2,y2).
 - b) Program to clear a portion of a screen.
6. Programs to get familiarized with DOS and BIOS interrupts.
- a) Program to display the current working directory.
 - b) Program to change the working directory.

Note:- A minimum of 20 programming examples have to be done.

References :

1. Microprocessor x86 Programming – K.R. Venugopal and Raj Kumar – BPB publications
2. The Intel Microprocessors 8086/8088, 80186/188, 80286, 80386, 80486, Pentium & Pentium Pro Processor Architecture, Programming and Interfacing- Barry B. Brey – PHI Edition
3. Microcomputer Systems – The 8086/8088 Family Architecture, Programming & Design – Yu Cheng Liu , Glenn A Gibson – PHI Edition.

MCA307 COMPUTER GRAPHICS AND MULTIMEDIA LAB

Programs can be set covering the aspects of

- 1) Line Drawing
- 2) Circle generation
- 3) Ellipse Generation
- 4) Spline curve generation
- 5) 2D Transformations
- 6) 2D Clippings
- 7) 3D Transformations
- 8) Creating a multimedia presentation incorporating images, audio and video.
- 9) Basic OpenGL operations- Displaying points, lines, polygons
- 10) Creation of animation using OpenGL