Tamil Nadu Open University

SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

FIRST YEAR

MCA 01 Computer Fundamentals

Block 1 : Hardware Concepts : Introduction – Meaning of Computer – Generation of Computers – Data Representation : Number systems – Decimal representation – Alphanumeric – Computational data – Fixed point – Decimal fixed point – Floating point – Codes Error detection and correction – Instruction execution – Digital logic circuits : Objectives – Logic gates – Boolean algebra – Elements of Combinational circuits – Elements of Sequential circuits – Interconnection structures – Memory organization : ROM/RAM – Secondary memory – High speed memory – I/O organization : I/O peripherals – I/O techniques – I/O processes – External Interface.

Block 2 : CPU Organization : Basic structure of CPU – An advanced structure – Register organization - Micro-Operations : Register transfer, Arithmetic, Logic, Shift operations – Execution of Micro-operation – ALU and Control Unit : ALU Organization – Control Unit Organization – Register Organisation and Micro-Operations - Microprogrammed Control Unit : Meaning of Micro-programmed control unit – Microinstruction : Types – Formats – Simple structure of Control unit – Functions of Control Unit.

Block 3 : Microprocessor and Assembly Language Program : Microprocessor Architecture : Components of Microcomputer – CPU components – CPU registers – Instruction set – Characteristics of Instruction set – Addressing modes : Immediate, Direct, Indirect, Register, Register Indirect, Displacement, Stack Addressing schemes – Instruction Format Design – Fundamentals of Motorola 68000 Microprocessor – Introduction to Assembly Language : Fundamentals – Program development tools – Example - Interfacing Assembly program to HLL Program.

Block 4 : Parallel Organization and RISC : Introduction – Need of Multiprocessor – Characteristics – Interconnection structures – Interprocessor arbitration – Interprocessor communication – Cache coherance – Pipeline vector processing : Objectives – Method of Pipelining – Method of vector processing – Array processors – Parallel Algorithm : Data flow architecture – Parallel algorithms – RISC Objectives – CISC Objectives – RISC architecture – RISC pipelining – Performance analysis – Comparison of various RISC architectures.

Reference Books

1. Computer System Architecture by Mano M. Morris, PHI
2. Microprocessors and Interfacing – Programming and Hardware by Douglas V. Hall, McGraw Hill.
3. Computer Organization and Architecture by Stallings, William, Macmillan Int. Edn.

MCA 02 Introduction to Software

Block 1 : Programming Concepts: Introduction – Problem solving   Stages – Pseudocode –   Algorithm – Flowchart   – Translators – Machine, Assembly and Procedural Languages – Linkers – Loaders –Elements of a programming language – Graphical User Interface (GUI) – Operating system concepts   - Process Management – Multiprogramming – Multitasking – Timesharing – CPU Scheduling – Deadlock avoidance - I/O Device Management – Memory management – Partition – Partition – Page management – Swapping - File Management

Block 2 : UNIX Operating System : Foundations of UNIX operating system – Features of UNIX – Structure of UNIX operating system – File System – Different types of files – Command format – Text Manipulation commands – Text Editor – Line editors : ed,ex line editors – Vi Screen editor – Sed – File permissions – Super user, owner and other user categories and their privileges – Communication between users – Super user privileges

Block 3 : Programming in Unix : Shell Programming – Command Interpreter – Environment variables – Parameter passing – Shell programming language constructs – operators – Expression evaluation – Support for C programming Code – read, echo, if, case – Loops: do, for loops – System Administration – Adding user accounts – Changing privileges – File system mounting and unmounting – Running background processes

Block 4 : Software Engineering : Software Life Cycle – Role of software engineer – Qualities of a software product – Principles of software engineering – Trends in Software Development – 4GL and Natural Languages –   System Investigations –   Control of System Investigations - Case Tools

Books of Reference:

1. T.W. Pratt – Programming Languages, Design and Implementation – PHI.
2. R.G. Dromey – How to solve it by Computer – PHI.
3. Operating system Design and Implementation by Andrew S. Tanenbaum – PHI
4. Software Engineering, Pressman

MCA 03   Data Structures through C

Block 1 : C Programming Language Fundamentals: Introduction – C Programming language – Structure of a C program – Preprocessor Directives – **main()** function – Data Types – Constants, Variables – Operators: Arithmetic, Relational, Logical, Assignment, Increment, Decrement, Bitwise, Miscellaneous operators - Input and Output functions – C programming IDE – Compiling and Running a simple program – C library functions through header files – Control Structures – if, switch, goto, for, while, do loops – Pointers

Block 2 : Structured Programming with C : Arrays – Single and Multi-Dimensional arrays – Character arrays – Structures – Unions – Bit fields – Storage Classes: auto, register, extern – Functions – Definition – Declaration – Call by Value – Call by Reference – Passing arrays – Passing a function to function – Pointer to function – Files: Text, binary files – Random access in files

Block 3 : Data Structures in C : Stack, Queue structures Defined – Implementation of stack and queue structures using array in C – Linked List : Singly, Two-way, Circular list – Implementation of linked list structure in C – Graphs – Adjacency matrix – Implementation of a directed graph in C – Graph Traversals: Depth First Search – Breadth First Search.

Block 4 : Tree, Searching and Sorting : Trees – Binary Tree – Representation of Binary tree in memory – Tree Traversals : Preorder – Postorder – Inorder - AVL-Trees and B-Tree – Implementation of trees in C – Searching and Sorting Techniques: Linear and Binary search – Sorting Techniques: Selection, Insertion, Quick, Heap and Two-way merge sort techniques implemented in C – File Organizations: Sequential, Indexed Sequential and direct organizations.

Reference Books :

1. Data Structures Using C
   Yedidyah Langsam,Moshe J.Augenstein,Aaron M.Tenenbaum, PHI

2. Data Structures, Dale and Lilly.

MCA 04 Elements of Systems Analysis and Design

Block 1 : Introduction – Definition of a System – Characteristics of a system – Elements of Systems Analysis – System development life cycle – Software crisis – Role of Systems Analyst – Project Selection : Project request – Managing Project selection – Preliminary investigation – Problem classification and definition – Feasibility study : Types of feasibility – Investigative study – Cost Benefit Analysis – Fact finding techniques – DFD – Data Dictionaries – HIPO – Decision tables and Decision Trees – Warnier Orr Diagrams.

Block 2 : Structured System Design : Introduction – Design Methodologies – Structured Design – Modularization – Design process – Systems Specifications – Prototype design – Input design and control : Elements of Input data – Processing transaction data – Design guidelines – Input verifications and control – Layout of Terminal screen – Output System design – Output devices – Types of Output – Designing screen output/report – Form design – File and Database design – Types of file – File Organisation – File design – Database Design – Coding system – Types of Code.

Block 3 : System Development : Task of System development – Selection of Hardware and Software – Benchmark testing – Software selection criteria – Quality Assurance – Levels – Maintenance Issues – Levels of Test – Testing plan – Designing test data – System control – Documentation : Characteristics – Types of Documentation – Need for documentation – Tools – System Implementation : Conversion methods – Post Implementation Review – Review Plan – System Maintenance – MIS : Concept – Overview of Computing, Communication and Database technologies – DSS – Knowledge based system – Impact of MIS – Building MIS : Techniques

Block 4 : Emerging Trends – Attributes of a Good Analyst – Organisational Issues – Communicating with Computers – Ergonomics – Human problems in Automated office - Multimedia : Introduction – Components of Multimedia – Hardware and Software requirements – Simple case studies : Information system planning – Evaluation and Selection of a system.

Reference Books:

1. Systems Analysis and Design by James. A. Senn
2. Systems Analysis and Design by Elias M. Award.

MCA 05 Introduction to Database Management System

Block 1 : DBMS concepts : Introduction – Basics of Database – Three views of Data – Three level architecture of DBMS – Facilities – Elements of DBMS – Advantages and disadvantages – Database Models : File Management system and its drawbacks – Database Models : E-R Model, Hierarchical Model, Network Model, Relational Model.

Block 2 : File Organization : Introduction – Methods of File Organization – Sequential, Direct, Index Sequential – Multi Key file organization – Management Considerations : Objectives – Conversion – Evaluation of DBMS – Administration of DBMS.

Block 3 : RDBMS and DDBMS : Introduction – Relational Model – Concept – Definition of a relation – Relational algebra and relational completeness – Normalization : Objectives – Functional dependency – Anomalies in a database – Properties of Normalization – Various Normalization techniques – Examples of database design – SQL : Types of SQL commands – Data definition – Data Manipulation statements – Distributed Databases : Structure of Distributed database – Design of Distributed database.

Block 4 : Trends in DBMS : Objectives – Next generation Database – Application – Object Oriented system – Object Oriented DBMS – Pitfalls of RDBMS – Comparison of RDBMS and OODBMS – Client/Server Database : Objective – Evolution – Client/Server computing – Critical Products – Knowledge base Management system : Objectives – Definition and importance of Knowledge – Difference of KBMS and DBMS.

Reference Books:

1. Database System Concepts by Silberschatz, Korth and Sudarshan, McGraw Hill.
2. An Introduction to Database systems by Bibin C. Desai, Galgotia Publications.

MCA 06 Introduction to Computer Organisation

Block-1 :   Data Representation : Introduction – The Von Neumann Architecture – Generation of Computers – Data Representation : Decimal – Alphanumeric – Fixed – Decimal Fixed – Floating point – Error Detection and Correction codes – Instruction Execution.   Digital Logic Circuits – Introduction – Boolean Algebra – Logic Gates – Combinational Circuits – Sequential Circuits – Inter connection structures.

Block-2 : Pheripheral Devices : Memory Organization : Introduction – various memory devices – Types of Random Access Memory – Types of Auxiliary memory – High Speed Memories : Cache Memory – Interleaved Memory – Associated Memory.   IO Organization : I/O Model – I/O Techniques – DMA – I/O processes – External Interface.

Block-3   :   Instruction Set : Introduction – Characteristics – Addressing Modes – Instruction format – Examples. Registers organization : Structure of CPU – Register Organization – Micro operation – ALU Organisation – Control Unit Organisation – Microprogrammed Control Unit – Microinstruction: sequencing – Microinstruction Execution.

Block –4 : Microprocessor and Assembly Language Programming : Introduction – Microcomputer architecture – CPU components – Instruction set – Introduction to Motorola 68000 microprocessor – Assembly Language : Introduction – Assembly language fundamentals – I/O services – Assembly language program development tools – Examples : COM programs – EXE programs – Simple assembly language programs – Programming with loops and strings – Arrays – Modular program – Interface to high level program – Interrupts.

Reference Books :

Mano M.Morris, Computer System Architecture, Third edition, Prentice Hall of India (1983)

Hayes,John.P, Computer Architecture and Organisation, Second edition, McGraw Hill International editions, 1988

Doughlas V.Hall, Microprocessors and Interfacing – Programming and Hardware- McGraw Hill, 1986

MCA 07 Introduction to Software Engineering

Block 1 : Software Engineering Concept : Definition – Software Product – Components and characteristics – Phases in Software development – Software Process Models: Linear Sequential – Prototyping – RAD – Spiral – Incremental – Formal methods – Fourth generation techniques.

Block 2 : Project Management Concepts : People – Product – Process – Project Development Team Structures - Software Crisis – Role of System Analyst – Project planning and control : Planning objectives – Software scope – Resources – Project Estimation – Decomposition Techniques – Estimation Models – Project standards – Outsourcing – Risk Management : Risk – Identification – Projection – Refinement – Mitigation.

Blcok 3: Project Scheduling and Tracking: Basic concepts – Defining task set for the software project – Scheduling Plan – Software Quality Assurance: Quality concepts – Quality Assurance Activities – Software Reviews – Formal Technical Reviews – Software Reliability – ISO 9000 quality standards – Software Configuration management.

Block 4 : Software Analysis, Design and Testing : Analysis concepts and principles – Software prototyping – Specification Modeling and Information flow – Behavioural Modeling – Design Concepts and principles – Modular design – Architectural design and process – User Interface design – Software Testing : Principles – Test case design – White Box test – Block box testing – Testing Strategies : Unit – Integration – Validation – System – Art of debugging – Case study.

Reference Books:

1.   Software Engineering Practitioner's Approach by Roger S. Pressman
2.   Software Engineering Concepts by Richard and Fairlay
3.   An integrated approach to Software Engineering by Pankaj Jalote

MCA 08 Computer Oriented Numerical Methods

Block 1 : Computer Arithmetic and Solution of Non-Linear Equations : Introduction – Floating Point Arithmetic and Errors: Floating point represent of Numbers – Sources of Errors – Non-Associativity of Arithmetic – Propagated Errors – Pitfalls in Computation. Solution of Non-Linear equations: Bisection – Fixed point – Regula falsi – Newton's Raphson – Secant method. Convergence criteria of Iterative methods .

Block 2 : Solution of simultaneous Linear Algebraic Equations and ordinary differential equations : Cramer's Rule - Gauss elimination method – Pivoting Strategies - Gauss Jordan method – Jacobi Iterative method – Gauss Seidal method –Comparison of Direct and Iterative methods.

Block 3 : Interpolation and Curve Fitting : Problem of Interpolation - Langranges method of Interpolation – Inverse Interpolation – Newton's interpolation formulae – Error of the Interpolating Polynomial - Interpolation at equally spaced points : Forward and Backward differences – Newton's forward and backward difference formulas. Fitting of polynomials and other curve - Least square approximation of functions - linear and polynomial regressions.

Block 4 : Numerical differentiation and Integration : Differentiation based on polynomia fit - Numerical integration using Simpson,s rule and Gaussian quadratic formula - Numerical solution of differential equations of the form dy/dx=f(x,y) using Euler,s method and Runge-Kutta methods.

Reference Books :

1.   Numerical methods for Scientific and Engineering Computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain.
2.   Elementary Numerical Analysis by Samuel D.Conte and Cart de Boor, McGraw Hill International Edition.
3.   Numerical methods for Science and Engineering, PHI by R.G.Stanton
4.   Computer based numerical algorithms by E.V.Krishnamoorthy
5.   Introduction to Numerical Analysis by E.Atkinson

MCA 09 C++ and Object Oriented Programming

Block-1 : C++ Fundamentals : Object Oriented Programming - Programming Paradigms – Benefits and Concepts – Advanced Concepts – OOP languages – Overview of C++ - Structure of a C++ Program – Header Files - Keywords – Tokens and Identifiers – Compiling – Running C++ programs - Constants and Variables: Data Types – Integer – Float – Char – Double – Pointer – Variable and Constant declarations – Macro definitions – Reference variables – Complex variables – Type conversions – Type casting – Storage classes : auto, register, static, extern - Input and Output: Stream I/O – I/O Manipulators – Creating I/O manipulators – IOS flags – Stream buffer class hierarchy

Block-2 : Programming Constructs : Operators: Arithmetic – Relational – Logical – Assignment – Pre and Post Increment & Decrement – Bitwise – Scope Resolution :: operator – ?(conditional) – Value operator – Member operator – Indirection operator – new and delete operator – Precedence rules – Control structures: if – else – if elseif ladder – switch case - Iterative constructs - Loops – for loop – while loop – do while loop – Initialisation – exit condition – increment/decrement for three loops compared – Nesting loops – Creating infinite loops – break and continue statements – goto statement and labels

Block-3 : Data Structures : Arrays: Single Dimensional arrays - Declaration – Initialization – Multi-Dimensional arrays – Declaration – Initialization – Addressing method – Subscripts – Character arrays – Initialization – Null Character – Multi-dimensional character arrays – Structures: – Declaration – Definition – Bitfields – Array of structures – Structure containing arrays – Pointer to structures – Structures versus unions – Anonymous unions

Block – 4 : Structured and Object Oriented Programming : Functions: Structured Programming – Function definition & declaration – Parameters – Arguments – Return Values – void – Call by value parameters – Call by reference parameters – Passing arrays – Passing structures – Passing a function to another function – Pointer to function – Recursive function – Classes : and Objects – Visibility Labels – private, public and protected – Data members – Member functions – Object declaration and accessing members – Passing objects to functions – Returning objects – Constructor function – Destructor function – friend functions – static data and function members – Inline functions versus macros – Overloading: Compile-Time Polymorphism – Function overloading – Rules for function overloading – Operator overloading – rules for operator overloading -   Function templates – Class templates – Extensibility – Reusability – Inheritance – Run-Time Polymorphism – Virtual functions – Files: fstream header file - text and binary files creation and access – random access in files – storing objects in files – command-line arguments to main() function – Exception handling – Unified Modeling Language (UML) – Context Diagrams

Reference Books :

1. The C++ programming language, Bjarne Stroustrup, Pearson publications.
2. Object Oriented Programming in C++ by N.Barkakati, PHI.

MCA 10 Theory of Computer Science

Block 1 : Set, Relations and Functions : Sets – Notation and description of sets – subsets – operations on sets – Properties of set operations – Relations : Representation of a relation – Operations on Relations – Equivalence Relation Partitions and Equivalence Classes. Functions : Definition – One to one – Onto functions – Special type of functions – Invertible and composition of functions.

Block 2 : Logic : Introduction – Connectives – Statements : Atomic – Compound – Well formed – Truth Table – Tautology – Tautological implications and equivalence of formulae – Replacement Process – Normal forms – Principal Normal forms – Theory of Inference – Quantifiers – Theory of Inference for Propositional and predicate calculus.

Block 3 : Finite Automata and Languages : Definition – Representation of FA – Languages Accepted by FA - Non-deterministic Finite Automata – Regular Sets – Phase structure grammar – Context free grammar – Context free language – Finite Automata and regular languages – Turing Machines – Techniques for Turing Machine construction

Block 4 : Graph theory : Basic concepts – definition – paths – reach – ability and connectedness – matrix representation of graphs – trees.

Reference Books:

1. Discrete mathematical structures with applications to computer science by J.P.Tremblay and R.Manohar, McGraw Hill.

2. Discrete Mathematics by M.K.Venkatraman, N.Sridharan and N.Chandrasekaran. National publishing company, 2000.

MCA Lab – 1 : Programming in C with Data Structure
MCA Lab – 2 : Object Oriented Programming Using C++

MCA 11 Computer Graphics

Block 1 : Graphics Overview – Applications of Computer Graphics – Video Display Generation – Input Devices – Hard Copy Output Devices – Graphics System Software-Output Primitives : Point Plotting – Line Drawing Algorithms – Equation of a line: DDA – Bresenham's algorithms – Circle generation Algorithms – Drawing Ellipse – Other Geometric Shapes – Region Filling Techniques

Block 2 : 2D Transformations : Introduction - Two Dimensional Transformations: Transformation Principles – Basic Transformation – Matrix Representation – Composite Transformation - Two Dimensional Viewing and Clipping : Viewing Transformations – Windows and view ports – Aspect Ratio – Clipping and Shielding : Point Clipping – Line segment clipping – Convex Polygon clipping – Sutherland Hodgmam Algorithm.

Block 3 : 3D Transformations : Concepts – Basic Transformations : Translation, Scaling, Rotation and Mirror Reflection – Matrix Representation – Composite Transformations-Three Dimensional Viewing and Clipping : Viewing Process – Three Dimensional Viewing : Specifying Projection Plane and view volume – Clipping: Clipping against a finite view volume – Cohen Sutherland Algorithm – Constructing a three dimensional view – Hidden Surface Algorithm : Depth Comparison – Z-Buffer Algorithm

Block 4 User Interface Design : Introduction - Components of User Interface – The User's Model – The command Language – Styles of Command Language – Information Display – Feedback – Examples.

Reference Books :

1. Interactive Computer Graphics by M. Newmann and F. Sproull, McGraw Hill
2. Computer Graphics by Plastok and Gordon Kalley, McGraw Hill.

MCA 12 Design and Analysis of Algorithms

Block 1 : Introduction to Algorithms and its Development : Introduction - Algorithms – Basic Steps in Development : Statement of the Problem – Development of a Model – Design of an Algorithm – Correctness of the Algorithm – Correctness of the Algorithm – Programme Testing – Documentation

Block 2 : Basic Tools : Top-down structured Programming – Program Correctness – Example : The Knight's Tour – Networks (Graphs): Fundamentals - Representation – Trees – Isomorphism – Linked Lists – Adjacency Lists – Adjacency Lists – Push-down Lists – Queues – Probabilistic Model – Example : Performance Analysis of Straight Insertion Sort.

Block 3 : Algorithm Design Methods : Basic Problem Solving Methods : Sub goal, Hill-Climbing and Working Backward – Example : Jeep Problem -Backtrack Programming : Example; Bicycle Lock Problem – Branch and Bound: Example : Traveling Salesman Problem for five-city network-Recursion : Example : Factorials and Fibonacci Series, Ackermann's Function.

Block 4 : Simulation and Computer Science Algorithms : A single Queue – Single Server Problem – Sorting Techniques : Quick sort - Heap sort - A worst-case O (N log N) Sorting Algorithm – Searching : Binary Search : Average Complexity – Binary Tree Search and Insertion.

Reference Books :

1. Introduction to the Design and Analysis of Algorithms by S.E. Goodman and S.T. Hedetniemi.
2. Fundamentals of Computer Algorithms by Ellis Horowitz and Sartaj Sahni, Galgotia Publications.
3. Algorithms and Data Structures by Niklaus Wirth, PHI.

MCA 13 Accounting and Finance on Computers

Block 1 : Fundamentals of Accounting : Principle of Accounting – Accounting and its Function : Double Entry Book Keeping – Journal – Rules of Journalising – Ledger – Trial Balance – Rectification of Errors – Trading Profit and Loss Account – Balance Sheet.

Block 2 : Financial concepts : Financial Statement – Nature of Financial Statements – Limitations of Financial Statements – Types of Analysis – Tools of Analysis – Trend Analysis – Comparative Statement – Ratio Analysis : Types of Ratio – Factors affecting efficiency of Ratio – Limitations of Ratio – Fund Flow Analysis – Cash Flow Analysis.

Block 3 : Cost Accounting : Introduction to Costing – Cost elements – Classification of costs – Materials – Stock levels – ABC Analysis – VED Analysis – Labour – Methods of wage payment – Incentive schemes of wage payment : Overheads – absorption of overhead – Machine hour rate method.

Block 4 : Methods of Costing and Budgeting : Marginal Costing – Break even analysis – Application of Marginal Costing – Limitations – Budgeting : Importance of Budgeting – Budget factors – Cash Budget – Sales Budget – Flexible Budget – Management of Working Capital.

Reference Books:

1. Advanced Accountancy by R.L.Gupta, and M.Radhasamy, Sultan Chant & Sons.
2. Principles of Management Accounting by Man Mohan and Goyal.
3. Studies in Cost Accounting by P. Das Gupta, Premier Book company.

MCA 14 Communication Skills

Block 1 : .Communication: Concepts and definition – Importance – Process communication – Model – Types – Mode of communication – Objectives – Inter, Intra personal communication – Barriers – Commandments of communication-Developing communication skills : Reading : Preparation – Reading Styles – Linear reading – Faster reading – Reading techniques – Writing : Effective writing – Report writing – Speech writing – Minutes and communication aids – Agenda writing – Letters – Articles writing – Improving English language writing – When to write and when not to write Listening and

Block 2 : Speaking and Listening: Importance – Art of Listening – Advantages – Mode of Expression – Listening tests – Speaking : Art of conversation – Using telephone – Methods of asking questions – Brain Storming – Presenting reports – Improving Speech delivery – Expressing Techniques

Block 3 : Interview Techniques : What and Why? – Types of Interviews – Understanding the intricacies – Planning for interview – Answering Skills – Effective Communication during Interview – IPS – Mock Interview. Group Discussion : Purpose – Process of Group Discussion – Presentation – Getting Started – Art of Guiding and Controlling Discussion – Personality test through Group discussion – Lateral thinking – Participation Techniques – Mock Group Discussion.

Block 4 : Body Language : Origin and development of body language – Tool for Personality identification – Analysis of body language – Types – Desirable body language – Attitude and body language – Body language as a powerful communication-Negotiation Techniques : Meaning – Importance – Fundamentals – Preparation – Techniques for negotiation – Managing process of negotiation – Interpersonal behaviour – Mock Negotiation-Meetings : Meaning – Importance – Objectives – Leading and participating in meetings – Communication skills for meetings – Mock Meetings – Seminars.

Reference Books :

1. Organizational Communication by M.D. Jitendra, Rajat Publications.
2. Any Text book on Effective communication.

MCA 15 Computer Networks

Block 1 : Introduction: Uses of Computer Networks – Network Hardware and Network Software – Reference Models – Example Networks – Network Standardisation-Physical Layer: Transmission Media – Telephone System – ISDN – Broadband and Narrowband ISDN – ISDN and ATM – Communication Satellites.

Block 2 : Data Link Layer: Design Issues – Error Detection and Correcting Codes – Elementary Data link Protocols – Sliding Window Protocols – Protocol Specification and Verification: Finite State Models – Petri Net Models – Example D-link Protocol: HDLC – SLIP – PPP – Media Access Sub layer: Multiple Access Protocols – ALOHA – Carrier Sense Multiple Access Protocols – Collision Free Protocols.

Block 3 : Network Layer: Design Issues – Routing Algorithms – Congestion Control Algorithms – internetworking: Tunneling – Fragmentation – Firewalls – Network Layer in the Interne – IP – Subnets – Internet Multicasting – Network Layer in ATM Networks: Cell Format – Connection Setup – Routing and Switching – Services Categories – ATM LANs.

Block 4 : Transport Layer and Application Layer : Transport Service – Element of Transport Protocols: Addressing – Flow Control and Buffering – Multiplexing – Crash Recovery – Performance Issues – Measuring Network Performance – Internet Transport Protocols – TCP – UDP – Protocol for Gigabit Networks-Application Layer: Network Security – Cryptography – Secret and Public Key Algorithms – DNS – SNMP – Electronic Mail – Electronic Mail Privacy – World Wide Web: Client Side – Server Side – Multimedia – Audio – Video – Data Compression – JPEG, MPEG Standards.

Reference Books :

1. Computer Networks by Andrew S. Tannenbaum, PHI.
2. Computer Networks by Uless Black, PHIE.

MCA 16 Operations Research

Block 1 : Operations Research Basic Concepts : Introduction – Review of Probability and Statistics-Programming Techniques-Linear Programming and Applications : Graphical and Simplex Method – Transportation Problem – Assignment Problem.

Block 2 : Programming Techniques : Goal Programming – Integer Programming – Dynamic Programming – Non-Linear Programming.

Block 3 : Inventory and Waiting Line Models : Inventory Control-Deterministic and Probabilistic Models – Queuing Models.

Block 4 : Game Theory and Simulation : Competitive Situation: Game Theory – Simulation-Case Studies : Insulator India Limited – Use of Operations Research Techniques: ECS Corporation.

Reference Books :

1. Hamdy A.Taha
    Operations Research An Introduction
    Macmillan publishing company (1982)

2   Don.T.Philips, A.Ravindran, James.J.Solberg
    Operations Research – Principles and practice
    John Wiley & sons (1976)

MCA 17. Operating Systems

Block 1 : Fundamentals of Operating System : Introduction: What is an operating system – History of operating systems – Operating system concepts – System calls – Operating system structure-Process Management: Introduction to processes – Inter-process Communication: Race conditions – Critical sections – Mutual exclusion – Semaphores – Event counters – Monitors – Message Passing.

Block 2 : Process Management : Introduction - Round robin scheduling – Priority Scheduling – Multiple queues – Shortest job first – Policy driven scheduling – Two level scheduling-Input / Output Management: I/O Devices – Device Controllers – Goals of I/O Software – Interrupt handlers – Device drivers – Device-independent I/O Software – User-space I/O Software – Deadlocks: Resources – Deadlock modeling – Detection and Recovery – Deadlock Prevention – Avoidance.

Block 3 : Memory Management: Memory management without swapping or paging: Multiprogramming without swapping or paging – Multiprogramming and Memory usage – Multiprogramming with fixed partitions – Swapping: Multiprogramming with variable partitions – Memory management with Bit-maps, Linked-lists and Buddy System – Analysis of Swapping Systems – Virtual Memory: Paging – Segmentation – Page replacement algorithms.

Block 4 : File Management : File basics – Directories – Disk space management – File storage – Directory structure – Shared file – File system reliability – File system Performance – File servers – Security – Protection mechanisms – Case Study Window NT, UNIX.

Reference Books :

1. Operating System Concepts by Silberschatz and Galvin, Addison Wesley
2. Operating system Design and Implementation by Andrew S. Tanenbaum – PHI
3. Operating System by Milan Milankovic, McGraw Hill.

MCA 18 Object Oriented Analysis and Design

Block 1 : The Object Model: The Evolution of the Object Model – Elements of the Object Model – Applying Object Model, Classes and Objects: The nature of an Object – Relationships among objects-Classes and Objects: The nature of the class – Relationship among classes – The Interplay of classes and Objects - On building quality classes.

Block 2 : Classification of Classes : Importance of Proper Classification– Identifying classes and objects : Classical and Modern Approaches – Object Oriented Analysis: Classical Approaches – Behavioral Analysis – Domain Analysis – Use Case Analysis – CRC cards – Structured Analysis – Key abstraction mechanisms

Block 3 : Object Oriented Design and development : Design Concepts – Development Process: Micro Development Process – Macro Development Process : Inception – Elaboration – Construction- Refactoring – Patterns – Transmission – Interactive Development – Pragmatics.

Block 4 : UML Diagrams : UML concepts – Diagrams : Use Cases - Class Diagram – Object diagram - Interaction Diagram – Package Diagram – State Diagram – Activity Diagram – Deployment Diagram – Programming using UML.

Reference Books :

1. Object Oriented Analysis and Design by Grady Booch, Addison Wesley
2. UML Distilled by Martin Fowler, Kendall Scott, Addison Wesley
3. Object Oriented System Development by Ali Bahrami.

MCA 19 Internet Programming

Block 1: Foundations for Internet Programming: An overview of Internet Programming – WWW Design Issues – Security and Encryption – Developing Intranet Applications.

Block 2 : Markup Languages : Introduction - SGML – HTML – Character, Text, Block level tags – Structure of Web pages – Cascading Style Sheets – Frames – Layers – Forms – Internet Explorer – Netscape Navigator.

Block 3 : Internet Programming Languages: Java in Windows – Java Virtual Machine (JVM) - Java Classes – Java Application Program Interface (API) - Applets - CGI – PERL – Microsoft Internet Implementation-Internet Scripting Languages: JavaScript – VBScript – Other Scripting Languages.

Block 4: Multimedia content in Web : Shock wave and Lingo - Active X controls: Creating an ActiveX control to Activate a Web Page – VDO live Technology – Creating Netscape Navigator Plug-Ins – Pulling Web Information – Creating a Custom Integrated Application with Multiple Protocols - Web Graphics: A Graphic View of Web – Easy Web Graphics – Images and Hyperlinks – Adding Graphics to Web Pages – Site and Page Design – Framing your Graphics – Dynamic Graphics – Animation.

Reference Books :

1. Web programming Unleased by Bob Breedlove et.al, Sams.net publishing.
2. Web Graphics Bible by Ron Wodaski, Comdex Computer Publishing.
3. Internet   Millenium Edition, Complete Reference by Young, TMH.
4. HTML The complete Reference by Powell, TMH.

MCA 20 Visual Programming

Block 1 : Windows Programming: Traditional Programming Paradigms – Overview of Windows Programming – Data Types – Resources – Windows Messages – Device Contexts – Document Interfaces – Dynamic Linking Libraries – Software Development Kit (SDK) Tools – Context Help.

Block 2 : Visual Basic Programming: Introduction – Forms – Variables, Types – Properties – Decision Making – Looping – Modules – Procedures – Functions-Tool Box Controls – Menus – Grid Controls – Dialog Boxes – Database Manager – Data Control – Record set Objects.

Block 3 : Visual C++ Programming: Objects – Classes - VC++ Components – Resources – Event Handling – Menus – Dialog Boxes – Importing VBX Controls – Files – MFC File Handling – Document View Architecture – Serialization

Block 4 : Interfacing Other Applications – Multiple Document Interface (MDI) – Splitter Windows – Exception Handling – Debugging – Object Linking and Embedding (OLE) – Database Application – DLL – ODBC.

Reference Books :

1. Windows Programming by Charles Petzold, Microsoft Press.
2. Visual Basic 6 from the ground up by Garry Cornell, TMH.
3. Visual C++ Programming by Steven Holzner, PHI.
4. Visual Programming by Yashwant Kanitkar.

MCA Lab – 3 : Internet Programming and Graphics
MCA Lab – 4 : Visual Programming and Accounting Package

MCA 21 Relational Database Management System

Block 1 : Database Management System : Database – Database Management System – Features – Advantages – Database Scheme – Schema and subschema – Manipulative capabilities – Guidelines – Different User Interfaces-Relational Model : Concepts of Relational Model – Comments on the Relational Model : Semantic issues, Navigation, Efficiency – DBMS based on the Relational Model : The mapping operation – Data manipulation facilities – Data Definition facilities – Data Control facilities

Block 2: Introduction to Oracle: Types of Databases - Relational Database properties - Benefits of Oracle - Client/ Server systems – Oracle Database Architecture: Overview of Oracle Architecture – Process - Physical files – CPU - Network System Tables - Oracle Users - Logical Structures.

Block 3: Oracle Database Fundamentals: Elements of SQL Language: Database Objects, Data Access SQL Commands, DML Commands – Oracle Queries – Basic Query, Using Expressions, Working with NULL values, Joining Multiple Tables in a Query, Selecting Distinct Values, Using Sub queries, Unions and Multiple part Queries-

Block 4 : Table Handling and Embedded SQL : Table Creation : Create table statement - Privileges required - Describing Table Definitions - Modifying Tables - Renaming a Table - Copying another table - Dropping a Table – Other Database Objects - Reason for Database Objects - Indexes – Embedded SQL : Languages supported by Oracle Precompiler - Embedded SQL : Languages supported by Oracle Precompiler, Embedded SQL statements.

Reference Books:

1. An Introduction to Database System by C.J.Date, Addison Wesley.
2. Database system concepts by Silberschatz, Korth and Sudarshan, McGraw Hill.
3. An Introduction to Database Systems by Bipin C.Desai, Galgotia publications.

MCA 22   Client Server Technology

Block 1 : Client Server Computing Concepts : Introduction to client / server computing – Main frame – Centric client / server computing – Down sizing and client / server computing – Preserving mainframe application – Investment through porting – Client / server development tools – Advantages of Client / Server computing.

Block 2 : Components of Client Server Environment : Client Component : Components of client / server application – The client – Client service, request for services, RPC, windows services, Fax / print services, Remote boot services, other remote services – Utility embedding – Common request broker architecture (CORBA) – Server Component: The server - Detailed server functionality – The networking operating system – Novell network – LAN manager – IBM LAN server – Banyan VINES-PC network file services.

Block 3 : Client Server Platforms : Server operating system : Netware, OS/2,Windows NT, Unix – System Application architecture (SAA) – Connectivity – Open systems interconnect (OSI) process communication (IPC) – Communication interface technology – Wide area network technology.

Block 4 : Client / serve development software – Platform migration and reengineering of existing systems – Hardware components - Distributed Objects and Internet: Distributed objects and components – Compound documents : The client framework – OLE / DCOM – Client / server and the Internet – Application Development Tools : Workbench architecture – Information engineering facility architecture – EASEL Workbench – Ellipse – SQL windows – Power builder – SQL Tool set – APT workbench component.

Reference Books :

1. Client Server Computing by Dewire and dawna travis, McGraw Hill.
2. Designing Enterprise Client/Server Systems by Beth Gold – Bernstein, David Marca PHI.
3. Client / Server Communications by Thomas S Ligon, TMH.

MCA 23 Multimedia Systems

Block 1 : Basic Concepts of Multimedia : Introducing Multimedia – Multimedia definition – Need, benefits and problems – System components – Multimedia platforms – Development tools: Type – Cross platform compatibility – Commercial tools – Standards

Block 2 : Media types : Non temporal – Text, image, graphics – Temporal – Analog, digital, audio / video, music, animation, other media types – Extended images, digital link, speech audio-Digital video and Image compression : Evaluating a compression system – Redundancy6 and visibility – Video compression techniques – Image Compression Standards – JPEG, MPEG, DVI.

Block 3 : Object Oriented Multimedia : Object, Classes and related items – Multimedia Frameworks: Overview - Media classes - Transform classes format classes - component classes

Block 4 : Multimedia Environments: The CD family, CD-i – Overview – Media Types – Media Organization – Architecture and Operations – Applications: Media in real world – Multimedia and single user – Multimedia on Networks – Training and Education.

Reference Books:

1. Multimedia In Practical Technology and Application by Judith Jeffcoate, PHI.
2. Multimedia Programming by Simon J.Gibbs and Dionysion C Tsichrikzis, Addison Wesley.
3. Multimedia Systems by John F. Koegel Buford, Addison Wesley.

MCA 24   Distributed Computing

Block 1 : Distributed Processing : Introduction – Distributed computing Models – Load Balancing – RPC – Process Migration - Hardware Concepts – Switched Multiprocessor – Bus based multi computers – Switched Multi computers – Software Concepts – Network Operating System and NFS – Time Distributed System. Design Issues: Transparency – Flexibility – Reliability – performance and Scalability.

Block 2 : Communications in distributed system : The Client/Server Model – Blocking versus Non Blocking Primitives – Buffered Versus Unbuffered primitives – Implementation of Client/Server model.

Block 3 : Synchronization in distributed system : Clock Synchronization in distributed systems – Clock Synchronization – Multi exclusion – Electron algorithms – Atomic transaction – Dead lock distributed system – Thread usage an implementation of thread packages – Processor allocation.

Block 4 : Distributed File System : File Service interface – Semantics of file sharing – Distributed file system Implementation of new trends in distributed file system. Distributed databases : Distributed DBMS Architecture – Storing Data in a Distributed DBMS – Distributed DBMS – Distributed catalog Management – Distributed query processing – Updating distributed data – Distributed transaction management – Distributed Concurrency control – Recovery.

Reference Books :

1. Advanced Concepts in Operating System by Mukesh Singal and Shivaratri N.G., McGraw Hill.
2. Modern Operating System by Tanenbaum A.S, PHI.
3. Distributed Operating Systems – Concepts and Design by Pradeep K.Sinha, PHI.

MCA 25 Network Programming

Block 1 : Active X Scripting : Overview of Active X Scripting – Java Scripting – Stand-Alone Scripts – Active X Controls – Creating Active X Controls.

Block 2 : Active X Documents : - Introduction – Active X Document Architecture – Creating Active X Documents

Block 3 : URL Monickers – Hyper linking – Hyperlink Interface – Working with URL Monickers - Overview of ISAPI – ISPAI Extension – ISAPI Filter

Block 4 : Designing IIS Applications – Building IIS Applications – Building Data Driven-DHTML Applications - Active X Documents – Technology – Migration Wizard – Modifying Code – Launching and Testing Document – Testing the DLL.

Reference Book :

1. Visual C++ from ground up by John Paul Muller, TMH.
2. Visual Basic 6 Complete Reference by Noel Jerke, TMH.

MCA Lab – 5   : Relational Database Management Systems

SIXTH SEMESTER

MCA 26 Project Work