

II Semester

MCA 201 - COMPUTER ORGANIZATION & ARCHITECTURE

Module I

Introduction: Basic structure of computers-Machine Instructions and programs: Memory Locations and addresses, Memory Operations, Instructions and Instruction sequencing, Addressing modes, Basic Input Output Operations, Subroutines

Module II

Input / Output Organization: Accessing I/O devices - Interrupts: Interrupt Handling - Handling multiple devices - Vectored Interrupts - Interrupt nesting - Daisy chaining - Direct memory access (DMA) – Buses – Introduction to I/O interfaces

Module III

The Main Memory: Memory Hierarchy – Main memory - RAM-ROM – Cache Memory – Performance Considerations -Virtual Memory- Memory Management Requirements, Secondary storage

Module IV

Central Processing Unit : Arithmetic & Logic Unit: Number Representation – Addition of positive numbers – Fast Adders – Signed Addition and Subtraction – Multiplication of positive numbers – Multiplication using Booth's algorithm - Fast Multiplication – Floating point numbers and Operations The Processing Unit : Basic Concepts - Instruction execution cycle - sequencing of control signals - hardwired control - PLAs - microprogrammed control - control signals - microinstructions- microprogram sequencing- Branch address modification- Pre fetching of microinstructions

Module V

Introduction to parallel Processing: Parallel processing - Principles and Classification - Pipelining – Arithmetic pipeline – Instruction pipeline – Vector processing – Array Processors – Multiprocessors - Comparison of RISC and CISC.

Text Book :

Computer Organization – V. C. Hamacher – (Mc – Graw Hill International Edition)– Fifth Edition

References :

1. Computer System Architecture – M Morris Mano –(Prentice Hall)- Third Edition
2. Computer Organization and Architecture- William Stallings – Fifth Edition
3. Structured Computer Education – Andrew S Tanenbaum-(Prentice Hall)-Fourth Edition

MCA 202 DATA STRUCTURES

Module I

Introduction: Algorithmic notation, Introduction to algorithm analysis for time and space requirements.

Arrays: Ordered lists – polynomial addition, sparse matrices, representation of array.

Module II

Linked List: Singly linked list, Linked stacks and queues, Polynomial addition, Equivalence

relation, sparse matrices, doubly linked list and dynamic storage management, Garbage collection and compaction. Strings – data representation for strings, Pattern matching in strings,

Module III

Stacks and Queues : Definition and concepts, Operations on stacks. Application of stacks-recursion, polish expressions and their compilation, queue, representation of queue, circular queue, deque, priority queue, Application of queues, Linked stacks and queues.

Module IV

Trees : Basic terminology, binary trees, binary tree representation, Binary tree traversal, threaded binary trees, binary tree representation of trees, Application of trees – Set representation, Balanced Trees-B,B+.

Graphs: Terminology and representation, Traversals, Connected components and AVL.

Module V

Internal Sorting and External Sorting: Searching – Linear search, binary search, Fibonacci and interpolation search. Comparison of different methods. Sorting – Insertion, Bubble, Selection, Quick, heap, Radix sort, Merge sort comparison. Sorting with disks - K way merging, Run generation.

Hashing Techniques: Different hashing functions, methods for collision handling

Text Book:

1. Fundamentals of data structures – Ellis Horowitz and Sartaj Sahni (Galgotia)
2. An introduction to data structures with applications – Jean Paul Tremblay, Paul G Sorenson(Tata McGraw Hill)

References:

1. Data Structures – E.M Reingald , W Hamen (CBS Publishers and distributors)
2. Data Structures – a pseudocode approach with C –Richard F Gilberg, Behrouz A Forouzan, Thomson Learning, 2 Edn.
3. Data Structures and program design – R. L Kruse (Prentice Hall of India)
4. Data structures using C – Tanenbaum and Augustine (Prentice Hall of India)
5. Theory and problems of data structures – Seymour lipschutz (Tata McGraw Hill)
6. Data structures and Algorithms in C++, Adam Drozdek, Thomson Learning, 3 Edn
7. Classic data structures – D Samanta (PHI)

MCA 203 – MICROPROCESSORS & EMBEDDED SYSTEMS

Module 1 - The Processors : 8086

Register Organization of 8086, Architecture, Signal Description of 8086, Physical Memory Organization, General Bus Operation, I/O Addressing Capability, Special Processor Activities, Minimum Mode 8086 System and Timings, Maximum Mode 8086 System and Timings. Addressing Modes of 8086.

Module 2 - Instruction Set, Assembler Directives and Assembly Language Programming of 8086

Machine Language Instruction Formats – Instruction Set of 8086-Data transfer instructions,Arithmetic and Logic instructions,Branch instructions,Loop instructions,Processor Control instructions,Flag Manipulation instructions,Shift and Rotate instructions,String instructions, Assembler Directives and operators,Example Programs,Introduction to Stack, STACK Structure of 8086, Interrupts and Interrupt Service

Routines, Interrupt Cycle of 8086, Non-Maskable and Maskable Interrupts, Interrupt Programming, MACROS.

Module 3 - Special Purpose Programmable Devices and their Interfacing

Data transfer schemes-programmed I/O, Interrupt I/O, DMA, DMA Controller 8257, Programmable Interval Timer 8253, Programmable Interrupt Controller 8259A, Programmable Communication Interface 8251 USART

Module 4 - Comparison of various Processors

16 bit,32 bit,64 bit processors-Intel 80286,80386,80486, Pentium,Pentium Pro, Pentium II,Pentium III and Pentium 4

Module 5 - Introduction to Embedded Systems

Embedded system – classification, Components of an Embedded system Hardware-processor, memory, Interfacing processor, and I/O devices, Devices and buses for device networks, Device drivers and interrupt servicing mechanisms.

Text Books :

1. Advanced Microprocessors and Peripherals – Architecture, Programming and Interfacing by A.K. Ray and K.M. Bhurchand, Tata McGraw Hill,2002 Edition
2. Embedded Systems – Architecture, Programming & Design by Raj Kamal -Tata McGraw Hill.

Reference Books :

1. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, 2nd Edition, Tata McGraw Hill, 2002.
2. The Intel Family of Microprocessors: Antonakos, Thomson Learning, 1 Edn
3. The 8086 Microprocessor Programming and Interfacing the PC, Kenneth C. Ayala, Thomson Learning, 1 Edn
4. The Intel Microprocessors 8086/8088, 80816/80188, 80286, 80486 Pentium and Pentium Pro Processor – Architecture, Programming and interfacing by Barry B Brey, 4th Edition, PHI
5. Microprocessor x86 Programming by K.R. Venugopal and Raj Kumar – BPB publications
6. Microprocessors and Microcomputer based system design by Mohamed Rafiqussaman.
7. Micro Controllers – [Theory And Applications] by Ajay V. Deshmukh- Tata McGraw Hill.
8. Microcomputer Systems – The 8086/8088 Family Architecture, Programming & Design by Yu Cheng Liu , Glenn A Gibson – PHI Edition.

MCA 204 OBJECT ORIENTED PROGRAMMING & C++

Module I

Introduction to Object-Oriented Programming: Evolution of programming methodologies. Procedural Approach Vs Object-Oriented Approach. Encapsulation and Abstraction, Message Passing, Inheritance, Reusability, Extensibility, Polymorphism, Overloading.

Objects and Classes: Access Specifiers. Memory Allocation for Objects, Friend Functions and Friend Classes, Static Data Members; Static Member Functions. this pointer. Comparison of class with structure. Inline functions.

Arrays and Strings: Arrays Within a Class; Arrays of Objects; Objects as Function Arguments; Returning Objects; const Member Functions; Constructing Two-Dimensional

Arrays. String Manipulation using objects

Module II

Constructors and Destructors: Purpose of Constructors and Destructors. Default Constructors, Constructors with & without parameters, Constructor Overloading, Copy Constructor. Invoking Constructors and Destructors.

Pointers in C++ : Pointer declaration and Access, Pointer to void, pointer and arrays, pointer to pointer, pointer to functions, call by pointer, pointer arrays, Jagged array, array of pointers to string, memory management – new and delete, pointer to object. self referencing class, wild pointers.

Module III

Polymorphism: Overloading Concepts, Function Overloading: Operator Overloading: Defining Operator Function, Rules for overloading Operators. Overloading unary operators, overloading binary operators, Overloading Comma, [], (), ->, new, delete Operators. Type Conversions – Basic to Class, Class to Basic and One class to another class type, Advanced Type Casting.

Module IV

Inheritance: Basic Concepts, Reusability & Extensibility. Defining derived classes, protected access specified in Base class constructors and destructors in derived classes – Types of Inheritances. Making a Private Member Inheritable; Member Classes: Nesting of Classes.

Virtual Functions: Virtual Base Classes, Normal member functions accessed with pointers, virtual member function access, late binding, pure virtual function, abstract classes.

Module V

Console I/O operations: C++ streams and C++ stream classes – Predefined Objects, unformatted I/O operations, Formatted I/O operations - manipulators - User defined manipulators - Overloading << and >> Operators for Objects.

Disk I/O Operations: Stream Classes, classes for file stream operations, opening and closing a file, file nodes, writing an object to disk, reading an object from disk, binary versus character files, I/O with multiple objects, tellg() and seekg(), seekp() and tellp(). Updating a File : Error Handling During File Operations; Command-Line Arguments ,sequential access to a file, file input/output with stream class,error handling during file manipulations, filter utilities.

Templates: Generic Functions- A generic swap function, Functions with more than one Generic Type, Overloading a Function Template. Generic Classes – A stack generic class, Class template with more than one Generic Type, type name and template keywords, Template Restrictions, The power of Templates.

Exception Handling: Fundamentals of Exception Handling, Catching Class Types, Using Multiple catch statements, Catching All Exception, Restricting Exception, throw statement, Setting the Terminate and Unexpected Handlers, Uncaught exception, bad_exception Classes, and Built-In Exceptions. Exception Vs Error Handling, Assertion in C++.

Text Books:

1. Deitel & Deitel, *C++ How to program*, Pearson Education Asia, 3rd Edition.

Reference Books:

1. Computer Science: A Structured Programming Approach Using C++, Forouzan, Thomson Learning , 2 Edn
2. C++ Programming: Malik, Thomson Learning , 3 Edn

3. K.R Venugopal Rajkumar, *Mastering C++*, TMH.
4. Gaddis Tony, *Starting Out with C++*, dreamtech Press,
5. Sotter A Nicholas and Kleper J Scott, *Professional C++*, Wiley Publishing Inc.
6. Schildt Herbert, *The Complete Reference C++*, Tata McGraw Hill, 4th Edition

MCA 205 MANAGEMENT INFORMATION SYSTEMS

Module I -Organizations, Management , and The Networked Enterprise

Why Information Systems ? What is an Information System ? The new Role of Information Systems in Organizations : Towards the Digital Firm, Major Types of Systems in Organisations, Systems from a Functional Perspective : Sales and Marketing, Manufacturing and Production Systems, Finance and Accounting Systems, Human Resources Systems, Enterprise Applications. Strategic Information Systems.

Module II : Information Technology Infrastructure

Computer Hardware and IT Infrastructure, Types of Software, Managing Hardware and Software Assets, Managing Data Resources – Organising data in The Database Approach to Data Management, Database Trends, Telecommunications and Networks – Components and Functions of a Telecommunications System, Communications Networks- LANs, WANs, Network Services and Broadband Technologies, Electronic Business and E-commerce Technologies – Email and Groupware, Electronic Data Interchange, Internet Technology and Services.

Module III : Building Information Systems

Overview of Systems Development : Systems Analysis, Systems Design , Completing Systems Development Process, System – Building Approaches : Traditional Systems Lifecycle, Prototyping, Application Software Packages, Enduser Development, Outsourcing, Object Oriented Development, Rapid Application Development, Managing Implementation, Pitfalls in MIS development

Module IV: Managing Knowledge, Enhancing Management Decision Making

Systems as Planned Organisational Change, Business Process Reengineering and Process Improvement, Total Quality Management and Six Sigma, Knowledge Management in the Organization, Artificial Intelligence, Capturing Knowledge : Expert Systems, Neural Networks, Fuzzy Logic, Intelligent Agents, Decision Support Systems.

Module V : Managing Information Systems

Information Systems Security and Control- Systems Vulnerability and Abuse, Creating a Control Environment- Disaster Recovery Plan, Ensuring System Quality – Software Quality Assurance Methodologies and Tools, Growth of International Information Systems, Ethical and Social Issues related to Systems – Ethics in an Information Society, Moral Dimensions of Information Systems

Text Book :

Management Information Systems – Managing the Digital Firm : Kenneth C. Laudon, Jane P. Laudon , 8th Edition , Prentice Hall of India

Reference :

1. Management Information Systems, Effy Oz, Thomson Learning , 5 Edn
2. Information Systems for Modern Management by Robert G.Murdick, Joel E. Ross & James R. Claggett , 3rd Edition , Prentice Hall of India

3. Management Information Systems : Solving Business Problems with Information Technology: Gerald V. Post, David L. Anderson, Tat McGraw-Hill Publishing Co. Ltd.
4. Management Information Systems - Managerial perspective by D.P.Goyal, Macmillan India
5. Management Information Systems – Mahadeo Jaiswal , Monika Mittal , Oxford University Press

MCA 206 DATA STRUCTURES LAB

1. Program to represent sparse matrix manipulation using arrays.
2. Program to represent Singly Linked List.
3. Program to represent Doubly Linked List.
4. Program to represent Circular Linked List.
5. Program to represent Linked Stacks.
6. Program to represent Linked Queues.
7. Program to represent string operations.
8. Program to represent Stack operations using array and pointers.
9. Program to represent Queue operations using array and pointers.
10. Program to represent Conversion of infix to postfix.
11. Program to represent Evaluation of Expressions.
12. Program to represent Binary Tree Operations.
13. Program to represent Binary Tree Traversals.
14. Program to represent Searching procedures
15. Program to represent sorting procedures

MCA 207 C++ LAB

1. Program to Implement Classes and Objects.
2. Program to Implement Constructors and Destructors with array of Objects.
3. Program to Implement Passing and returning parameters as objects by reference.
4. Program to demonstrate Function Overloading.
5. Program to overload different operators – incr & decr operators with post & pre forms; new, delete, [], () and arithmetic operators.
6. Program to perform pointer sort operation.
7. Program to demonstrate friend functions and friend classes.
8. Program using objects for String manipulation functions.
9. Program to implement different types of inheritances like Multiple, Multilevel and Hybrid.
10. Program to demonstrate the use of Virtual Functions.
11. Program to demonstrate the use of abstract classes.
12. Program to demonstrate I/O streams and functions.
13. Program to Overload << and >> operators as a member and as a non-member operator functions.
14. Program to create a file to store some records and search for a particular record and display it.
15. Program to demonstrate namespaces and Volatile member functions.
16. Program to perform all possible Type Conversions.
17. Program to create function Templates, and overload the function Templates.
18. Program to create a generic stack class and member functions to perform stack operations.
19. Program to implement Exception Handling with minimum 5 exception classes including two built-in exceptions.