

COURSE SCHEME & SYLLABUS FOR MCA-M.Sc. COMPUTER SCIENCE

FOR THE YEAR

2016-2019

MCA - M.Sc. Computer Science – SEMESTER-II

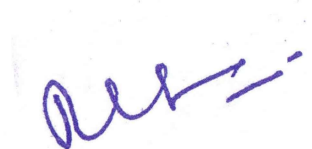
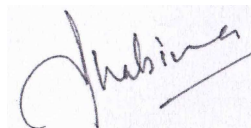
Core Courses

Course Code	Course Title	Credits	Scheme of Examination			
			Duration	Marks		
			Hours	IA	UE	Total
MC-241	Software Engineering	4	3	40	60	100
MC-242	Computer System Architecture	4	3	40	60	100
MC-243	Data and File Structures using C++	4	3	40	60	100
	Choice Based Open Elective	4	3	40	60	100
MC-271	Lab 3: C++	4	3	50	50	100
MC-272	Lab 4: Data and File Structures using C++	4	3	50	50	100
Total Marks				260	340	600

Choice Based Open Electives*						
1.	Fundamentals of Arabic Language	4	3	40	60	100
2.	Fundamentals of English					
3.	Mysteries of Green Plants : The corner Stone of Life					
4.	Botany in Rural Development					
5.	Fundamentals of Biotechnology					
6.	Mathematics in Real World					
7.	Information Technology Essentials					
8.	Fundamentals of Management					
9.	Business Communication					
10.	Basics of Tourism					
11.	Tourism Resources in J&K					

Note:

* Students will choose one of the above courses.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MC-241	Software Engineering	3	40	60	100	5	0	0	4

Objective:

This paper aims to help students to comprehend the role and scope of software engineering and equip them with the ability to apply Software Engineering practices.

Unit I

Basic Concepts of System Analysis and Design: System Concept, Characteristics and Elements of System, Types of System, System Development Life Cycle, Role of System Analyst, Information Gathering Techniques, Feasibility Study, Feasibility Considerations, Feasibility Report.

Introduction to Software Engineering: Software Myths, Software Characteristics, Software Engineering Challenges (Scale, Quality Productivity, Consistency and Repeatability, Change).

Unit II

Software Process Management: Characteristics of Software Process, Introduction to Software Process Models: Waterfall model, Prototyping model, Iterative model, Spiral Model; Planning: Cost Estimation, Uncertainties in Cost Estimation, COCOMO Model for Cost Estimation; Project Scheduling: Average Duration Estimation, Project Scheduling and milestones; Introduction to Staffing.

Unit III

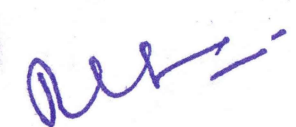
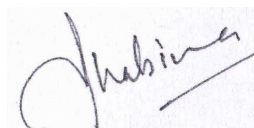
System Analysis: Introduction to Software Requirement Analysis and Specification, Software Requirements: Need for SRS, Requirement Process, Problem Analysis: Analysis Issues, Informal Approach, Structured Analysis (Data Flow Modeling), Object Oriented Modeling, Prototyping, Requirement Specification (Characteristics, Components), Metrics (Size & Quality).

Unit IV

Software Design-I: Function Oriented Design: Design Principles (Problem Partitioning and Hierarchy, Abstraction, Modularity, Top-Down and Bottom-Up Approaches), Module level Concepts (Coupling and Cohesion), Design Notations & Specifications (Structured Charts, Specification), Structured Design Methodology.

Unit V

Software Design-II: Object Oriented Design: OO Analysis and OO Design, Concepts of OOAD: Encapsulation, Abstraction, Inheritance and Polymorphism. Design Notations & Specifications, Design Methodology: Dynamic Modeling, F Defining Internal Classes and Operations.

Introduction to Software Testing: Testing Fundamentals: Error, Fault and Failure, Test Oracles, Test Cases and Criteria, Psychology of Testing. Test Strategies for Conventional Software testing (Unit Testing, Integration Testing)

COURSE OUTCOMES:

CO 1: This unit explains basic concepts of System Analysis and Design and at the same time introduces Software Engineering along with its challenges. The student shall be acquainted with the difference, similarities and relation among the two subjects.

CO 2: The student shall be able to know various software process models and the scenarios during which these models suit the best. The student would also be able to perform Software Project Cost Estimation, Project Scheduling and Project Staffing.

CO 3: The goal of this unit is to acquaint the student to design and develop Software Requirement Specification Document and various techniques of Problem analysis.

CO 4: The Students will be able to know various concepts of Function oriented approach of System Design along with Module level concepts and notations and charts that are used for developing a function oriented design.

CO 5: This unit enables the student to develop Object Oriented Software Design and notations and charts that are used for developing the same. This unit also introduces various Software Test Techniques that are used for testing the newly software.

Note for Paper Setting:

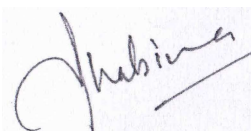
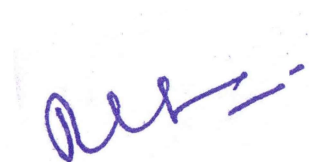
The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Textbooks:

1. **Pressman, R S (2006)**, “Software Engineering – A Practitioner’s Approach”, Sixth edition, **TMH**.
2. **Jalote, P(2005)**, “An Integrated Approach to Software Engineering”, 3Rd Edition, **Narosa Publication**.

References:

1. **SCHAUM’S Outlines(2005)**, “Software Engineering”, **TMH**.
2. **Sommerville(2000)**, “Software Engineering”, **Addison Wesley**.



Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MC-242	Computer System Architecture	3	40	60	100	6	0	0	4

Objective:

This paper aims to specify the relationship between different hardware components of a computer system and its working. The course is basic and will help the students to learn the basic concepts of Computer Architecture and Organization.

Unit-I

Basic architecture of computer: Functional units, Operational concepts, Bus structures, Von Neumann Concept.

Basic Processing: Instruction code, Instruction set, Instruction sequencing, Instruction cycle, Addressing modes, Micro instruction & Micro program, Control Unit: Hardwired controlled unit, Micro programmed controlled unit.

Unit-II

Design of ALU: Binary Arithmetic, Addition, Subtraction, Multiplication, Division of signed numbers, Floating point number representation: Big Endian & Little Endian.

Unit-III

Memory Hierarchy: Main Memory: Technology, Design, Types (Static & Dynamic). Auxiliary Memory: Magnetic Disks: Technology, Design, Types. Cache Memory: Hit Miss Ratio, Mapping Functions.

Virtual Memory: Concept, Design Issues, Page Replacement.

Unit-IV

Input-Output Interface: Device Driver, Device Controller and I/O bus.

Address Specifications: Isolated versus Memory-Mapped I/O.

Data Transfer: Synchronous and Asynchronous (Strobe Control, Handshaking).

Modes of transfer: Programmed I/O, Interrupt-Driven I/O, and Direct Memory Access (DMA).

Unit-V

Parallel Processing: Pipelining: General considerations of Pipelining, Arithmetic Pipeline, Instruction pipeline, Pipelining Hazards: (Data dependency, Branch handling). Vector Processing: Principle & Considerations, vector Instructions. Memory Interleaving. Array Processors, Attached Array Processors.

COURSE OUTCOMES:

- CO1.** Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, addressing modes, instruction set.
- CO2.** Students will be able to explain the working of ALU for addition, subtraction, multiplication and division for signed and floating-point numbers.
- CO3.** Students will be able to explain the working of different types of memory, their advantages and disadvantages.
- CO4.** Students will be able to explain the input-output interface and issues related with data transfer between I/O device and memory.
- CO5.** Student will acquire the knowledge of working of parallel processing.

Note for Paper Setting:

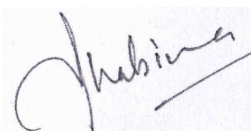
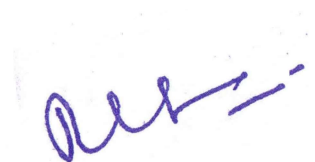
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Text Books:

1. **M. Mano**, Computer System Architecture, 3rd Ed., **PHI**.

References:

1. **C. Hamacher**, Computer Organization, 5th Edition,
2. **W. Stallings**, Computer Organization and Architecture, 7th Edition.



Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MC-243	Data & File Structures using C++	3	40	60	100	6	0	0	4

Objective:

The objective of the course is to introduce implementation, evaluation and analysis of the fundamental data structures for representing and manipulating data. The implementation of the same is carried out using C++.

Unit-I

Introduction to Data Structure: Concept, Basic Terminology, Elementary Data Structures, Abstract Data Type, Arrays & its representation, Operations on Arrays, Sparse Arrays, Pointers, Linked List (Singly, Double & Circular), Operations on Linked List (Traversing, Insertion, Deletion etc.), Introduction to Garbage Collection.

Unit-II

Stacks and Queues: Basic Concept, implementation, Applications: Recursion (Fibonacci Series, Factorial & Tower of Hanoi problem), Polish Expressions and their Compilations (Infix, Prefix, Postfix), Queues and their implementation, De-Queues, Priority Queues.

Unit III

Trees: Concept, Binary Trees, Tree Traversal Techniques (Preorder, Post order, In order), Complete Binary Trees, Binary Search Tree & Operations on Binary Search Tree (Searching, Insertion & Deletion), Height Balance and Concept of AVL Trees and purpose of B-Trees.

Unit IV

Graphs: Concept, Directed Graphs, Graph Representation (Adjacency Matrix and Linked Representation), Dijkstra's shortest Path Algorithm, Graph Traversal Techniques (Breadth First Search & Depth First Search).

Searching and Sorting: Linear & Binary Search, Merge Sort, Heap Sort, Quick sort.

Unit-V

Files: Basic terminology Attributes of a File, Classification of Files.

File Organizations: Sequential File Organization, Relative File Organization, Indexed Sequential File Organization (Primary, Clustering and Secondary).

Hashing: Basic concept, Hash Table, Hash Function.

Course Outcome

On the successful completion of the course, students will be able to

CO1. Understand the concept of Data Structure, Abstract Data Type, Arrays & its representation, Operations on Arrays, Sparse Arrays, Pointers, Linked List (Singly, Double & Circular), Operations on Linked List (Traversing, Insertion, Deletion etc.).

CO2. Implement a solution for a given Search problem (Linear Search and Binary Search).

CO3. For a given problem of Stacks, Queues and linked list student will be able to implement it and analyze the same to determine the time and computation complexity.

CO4. Write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.

CO5. Implement Graph search and traversal algorithms and determine the time and computation complexity.

CO6. Write C++ programs for File Management

Note for Paper Setting:

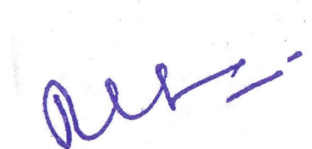
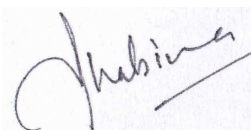
The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Text Books:

1. **Baluja G. S.**, "Data Structures Through C++", **Dhanpat Rai & Co.**
2. **Seymour Lipschutz**(SCHAUM'S ouTlines), "DATA STRUCTURES", **Tata McGraw Hill, 2006.**

References:

1. **R. Kruse**, "Data Structures & Program Design in C", **Pearson Education, 2004.**
2. **Dr. PrabhakarGupta,VineetAgarwal, Manish Varshney**, " Data Structure Using 'C', **FIREWALL MEDIA ,2007**
3. **Tanenbaum**, "Data Structures Using "'C" & "C++"', 2nd Ed. **PHI Publication,2005.**

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MC-271	Lab 3: C++	3	50	50	100	0	0	6	4


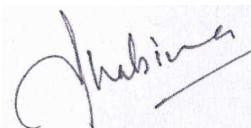
Course Outcomes:

CO1. Understanding of Object Oriented concepts with knowledge of differentiation between C++, ANSI & standard C.

CO2. To demonstrate the concept of class, object constructor, destructor, abstraction, inheritance, and polymorphism. And also different types of variables, functions and operators.

CO3. Students will be able to develop programs for implementing different data structures

CO4. Gain knowledge of file, streams, Template and exception handling and implement the same.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MC-272	Lab 4: Data and File Structures using C++	3	50	50	100	0	0	6	4

Course Outcomes

On the successful completion of the course, students will be able to

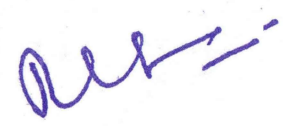
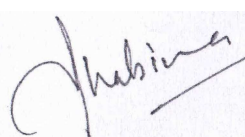
CO1: Write C++ programs to implement linear data structures : Stack and Queue using arrays and linked list in an application context

CO2: Implement Non linear data structures: Graph, Trees, Hash table in an application context

CO3: Implement specific sort algorithms in application context.

CO4: Write C++ programs to implement Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort

CO5: Write C++ Programs to Implement Graph search and traversal algorithms.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
CBCS	Choice Based Open Elective	3	40	60	100	5	0	0	4

Objective:

The objective of this course is to acquaint students with the basic knowledge of computers and train them to understand the preliminary elements of computing and the corresponding tools that are used to handle routine tasks. The course is fundamental in nature and does not therefore, require any background of computers.

Unit-I

Basic Computing Elements

Information Types: Text, Audio, Video, and Image, storage formats.

Components: Operating System, Hardware and Software, firmware.

Devices: Computer, Mobile Phones, Tablet, Touch Screen, Scanner, Printer, Projector, smart boards.

Processor & Memory: Processor functions, speed, Memory types: RAM/ROM/HDD/ DVD-ROM/Flash drives.

Unit-II

Office Automation

Working with Files: Create New Documents, Open Existing Documents, Save Documents to different formats.

Working with Text: Formatting Text, Spelling and Grammar, paragraphs, indentation, margins.

Tables: Insert Tables, Nested Tables, Insert Rows and Columns, Table Properties.

Page Margins, Gutter Margins, Graphics, Print Documents.

Spreadsheet Basics: Adding and Renaming Worksheets, Modifying Worksheets, Moving through Cells, Adding Rows, Columns, and Cells, Selecting Cells, Moving and Copying Cells.

Formulas and Functions: Formulas, Linking Worksheets, Basic Functions, AutoSum.

Charting: Chart Types, drawing charts, Ranges, formatting charts.

Create a new presentation, AutoContent Wizard, Design Template, Blank Presentation, Screen Layout, Working with slides & Graphics, slide animation/transitions.

Unit-III

Internet Basics

Computer Network Types: LAN, PAN, CAN, MAN, WAN, Concept of Internet, Brief history, Browsing the Web, Hypertext and hyperlinks, browsers, Uniform resource locator.
Internet Resources: Email, Parts of email, Email address, Newsgroups/Forums, Chat rooms, Conferencing.
Protecting the Computer: Password protection, Viruses, Virus protection software, Updating the software.

Unit-IV

Communication Systems

Evolution of mobile communications, Applications of wireless Mobile Communication, Mobile Radio System around the world, Types of Wireless communication System, Comparison of Common wireless system, Second generation Cellular Networks, Third Generation (3G) Wireless Networks. Cell fundamentals, Concept of Handoff, Concept of coverage area, Introduction to Bluetooth, GPRS, Wi-Fi.

Unit-V

Internet Applications

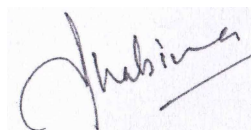
Social Networking: Features, Social impact, emerging trends, issues.
Social Networking sites: Facebook, Twitter, linkedin.
Online Resources: Wikipedia, Blog, Job portals, C.V. writing.
e-learning: e-Books, e-Magazines, e-News papers.
OCW (open course wares): Sakshat (NPTEL) portal, MIT courseware.

COURSE OUTCOMES:

- CO1.** Students will be able to understand the basic internal and external components of computer systems and types of information formats such as Text, Audio, Video, and Image.
- CO2.** Students will be able to work with Office Automation such as MS Office, WPS etc.
- CO3.** Students will be aware about Networking, Internet and Computer System Protection.
- CO4.** Students will be able to understand the various types of Communication Systems such as 2G, 3G, Bluetooth, GPRS and Wi-Fi technologies.
- CO5.** Students might be aware and able to work with various Internet Applications such as Social Net Workings and E-Learning resources.

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Text Books:

1. **Sinha , P. K (2005)**,“Computer Fundamentals”, BPB, **New Delhi**.

References:

1. **Theodore S. Rappaport**, “Wireless Communication Principles & Practice”, 2nd Ed. **PHI, New Delhi**.
2. **TCI**, "**Introduction** to Computers and Application Software", Publisher: Jones & Bartlett Learning, 2010, ISBN: 1449609821, 9781449609825.
3. **June Jamrich Parsons, Dan Oja**, "Computer Concepts Illustrated series", Edition 5, Publisher Course Technology, 2005, ISBN 0619273550, 9780619273552.
4. **Basandra, Suresh K (2005)**, “Computers Today”, Galgotia Publications.
5. **Saxena, S (2005)**, “MS Office for Everyone”, Vikas Publications.

