



# AHMEDABAD UNIVERSITY

## AES INSTITUTE OF COMPUTER STUDIES

### Master of Computer Applications (M.C.A.)

**First Year MCA :**

**Trimester I**

**Subject Code:** MCA 111

**Subject:** Structured Programming using C

**Lecture per week** : 3 Lecture + 1 Tutorial

**Practical per week (hours)** : 4 Practical

**Internal Assessment** : 50 Marks

**External Assessment** : 50 Theory + 50 Practical Marks

**Total Credit** : 8

**Prerequisite:** None

**Aim:**

The course is aimed to give introduction to problem solving and structure programming and give them in depth knowledge of important features of C. Techniques will be illustrated using sample problems drawn from various areas.

**Objectives:**

Developing problem-solving skills and programming logic.

Solving problems using structured programming approach

To make students familiar with programming language.

To develop program using proper control structures.

To understand concept of array and character string.

To make modular programming using function.

<b>Unit No.</b>	<b>Topics to be Covered</b>	<b>No. of Lectures</b>	<b>Marks per Unit</b>
Unit I	<b>Introduction to problem solving</b> Algorithm, flowcharts, pseudocode, structured programming: declaration of variables, simple logic, conditional statements, conditional constructs, branching of logic. <b>Constants , Variables and Data types</b> Character set, C tokens, keywords and identifiers, constants, variables, data types <b>Operator and Expressions</b> Operators(arithmetic, relational, logical, assignment, increment and decrement, conditional, bitwise, special) , precedence of arithmetic operators, type conversion in expression, operator precedence and associativity, mathematical function, Data types, variables and constants.	9	12



Unit II	<b>Input and Output operations</b> Reading and writing characters, formatted input and output. <b>Decision making and Branching</b> if statement, if...else statement, nesting of if...else statement, else if ladder, switch statement, goto statement. <b>Decision making and Looping</b> While statement, do statement, for statement, jumps in loops	9	10
Unit III	<b>Arrays</b> one dimensional array, two dimensional array, multi dimension array <b>Character Arrays and String</b> Declaring and initializing string variables, reading strings from terminal, writing string to screen, arithmetic operations on characters, string handling functions, table of strings.	9	15
Unit IV	<b>User Defined Functions</b> Need for user defined functions, multi function program, definition of function, return value and their types, function declaration and calls, category of functions, nesting of function, recursion, passing arrays and strings to function, scope, visibility and life time of variables	9	13
	<b>Total</b>	<b>36</b>	<b>50</b>

#### Outcomes:

Upon the completion of this course, the student will be able to:

1. Use the basic concepts of problem solving.
2. Develop logic for problems
3. Use data types, variables, character strings, decision making statement, array and User defined functions in C.
4. Design, build, and execute C programs.

#### Reference Books:

1. Programming in ANSI C - E Balagurusamy – 4<sup>th</sup> Edition - McGraw-Hill Companies, New Delhi.
2. Mastering C- K R Venugopal, S R Prasad-1<sup>st</sup> Edition- McGraw-Hill Companies, New Delhi.



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#### Additional Reference Books:

- (1) The Complete Reference C, Herbert Schildt-4<sup>th</sup> Edition- McGraw-Hill Companies, New Delhi.
- (2) The C Programming language ANSI C version - Brian W. Kernighan and Dennis Ritchie- 2<sup>nd</sup> Edition- Prentice Hall
- (3) Let us C - Kanetkar Y. - 8<sup>th</sup> Edition, BPB Pub- New Delhi.

**Subject Code:** MCA 111

**Subject Name:** Structured Programming using C

**Practicals per week (hours)** : 4

**Total Marks (Practical Exam)** : 50

Sr. No.	Topics to be Covered	No. of Practicals
1	<b>Overview of C</b> Simple programs using console I/O functions <b>Constants, Variables and Data types</b> Declaration of Variables, Constants and data types Assigning values to variables Printing data using printf( ) function Reading data using scanf( ) function <b>Operators and Expressions</b> Operators (Arithmetic, Relational, Logical, Assignment, Increment and decrement, Conditional) Type conversions in expressions Mathematical functions	7
2	<b>Managing input and output operations</b> Reading a Character Writing a Character Formatted input and output <b>Decision making and branching</b> Simple IF statement The IF...ELSE statement Nesting of IF... ELSE statements The ELSE IF ladder The Switch statement The GOTO statement <b>Decision making and looping</b> The WHILE statement The DO statement FOR statement	10



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3	<b>Arrays</b> Declaration and initialization of one dimensional array Accessing array elements Displaying array elements Sorting arrays Two-Dimensional array 1. declaration and initialization 2. accessing and displaying	10
	<b>Strings</b> Declaration and initialization of strings standard library functions : 1. strlen( ) 2. strcpy( ) 3. strcat( ) 4. strcmp( ) Implementation without using standard library	
4	<b>User-defined functions</b> Multi-function program Definition of Functions Return values and their types Function calls Function declaration Category of functions Nesting of functions Recursion Passing arrays to functions Passing strings to functions	9
	<b>Total</b>	<b>36</b>



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### Master of Computer Applications (M.C.A.)

#### First Year MCA :

#### Trimester I

**Subject Code:** MCA 112

**Subject:** Computer Organization and Architecture

**Lectures per week (hours)**

: 3 Lectures + 1 Tutorial

**Practicals per week (hours)**

: 0

**Internal Assessment**

: 50 Marks

**External Assessment**

: 50 Marks

**Total Credits**

: 4

#### **Aim:**

The course is aimed to introduce the internal organization and architecture of computers

#### **Objectives:**

- (1) To understand the concept of number systems.
- (2) To understand the memory types.
- (3) To gain basic knowledge of digital electronics.
- (4) To make students familiar with CPU and IO architectures

<b>Unit No.</b>	<b>Topics to be Covered</b>	<b>No. of Lectures</b>	<b>Marks per Unit</b>
Unit I	<b>Representation of Information</b> Number systems: binary, octal, hexadecimal Conversion among Number Systems Floating point numbers Arithmetic operations on Binary Numbers Characters and codes ASCII, EBCDIC  <b>Memory Management Techniques</b> Primary memory, secondary memory, cache, virtual	8	12
Unit II	<b>Basic Logic Design</b> Gates: AND, OR, NOT, NAND, XOR, NOR Boolean algebra Combination circuit design Multiplexer, DeMultiplexer, Encoder and Decoder Flipflops Shift registers and counters Designing of Counters Redundant coding for error detection and correction	10	14



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### Master of Computer Applications (M.C.A.)

Unit III	<b>CPU Architecture</b> Microprocessors, Microcomputers and its architectures Introduction to Assembly Language Instruction format Addressing modes-direct, indirect, immediate, relative, indexed Instruction set selection Software hardware tradeoffs Instruction execution	9	12
Unit IV	<b>I/O Architecture</b> Properties of simple I/O devices and their controllers Transfer of information between I/O devices CPU and memory Program controlled and interrupt controlled information transfer DMA control, I/O channels and peripheral processors Testing and Troubleshooting I/O interfacing circuits	9	12
	<b>Total</b>	<b>36</b>	<b>50</b>

#### Outcomes:

Upon the completion of this course, the student will be able to:

1. Design digital circuits.
2. Write programs efficiently.
3. Troubleshoot memory, CPU and IO related problems.

#### Reference Books:

- (1) Digital Logic and Computer Design, M. Morris Mano, PHI.
- (2) Microprocessor Architecture, programming and applications with 8085, Ramesh S. Gaonker, Panram Int. Pub, 5<sup>th</sup> edition.
- (3) Computer Architecture and Organization, B. Govindarajalu, Tata Mc-Graw Hill, 1<sup>st</sup> edition.

#### Additional Reference Books:

- (1) Digital Computer Fundamentals, Thomas C. Bartee, Tata Mc-Graw Hill, 6<sup>th</sup> edition.
- (2) Digital Principles and Applications, Albert Paul Malvino and Donald P. Leach, Tata Mc-Graw Hill, 5<sup>th</sup> edition.



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## AES INSTITUTE OF COMPUTER STUDIES

### Master of Computer Applications (M.C.A.)

#### First Year MCA :

#### Trimester I

**Subject Code:** MCA 113

**Subject Name:** Database Management System-I

<b>Lectures per week (hours)</b>	: 3 Lectures + 1 Tutorial
<b>Practical per week (hours)</b>	: 4
<b>Internal Assessment</b>	: 50 Marks
<b>External Assessment</b>	: 50 Theory + 50 Practical Marks
<b>Total Credits</b>	: 8

**Prerequisite:** Basic Knowledge of Office Productivity Tools.

#### **Aim:**

The course is aimed to give knowledge of basic concepts related to Database Management Systems.

#### **Objectives:**

- (1) To understand the concept and architecture of DBMS.
- (2) To make students familiar in conceptual and database design.
- (3) To provide understanding of Query Language-SQL using Oracle 10g

<b>Unit No.</b>	<b>Topics to be Covered</b>	<b>No. of Lectures</b>	<b>Marks per Unit</b>
Unit I	<b>Introduction to Database Management Systems</b> Basic Concepts, Purpose of DBMS, Benefits of DBMS over File Systems, Data Models, Levels of Abstraction in DBMS, Structure of DBMS, Components of DBMS <b>Data Modeling (Part I)</b> Entity Sets, Relationship Sets, Attributes and Keys, Types of Entities and Relationships, ER Diagram.	9	10
Unit II	<b>Data Modeling (Part II)</b> Enhanced ERD. <b>Relational Modeling</b> Relational Structure – tables, rows (tuples), domain and columns (attributes), Keys: super key, candidate keys, primary key, entity integrity constraints and referential integrity constraints, transformation from ER to Relational. <b>Relational Algebra</b> Select, Project, Union, Difference, Cartesian Product	9	12



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### Master of Computer Applications (M.C.A.)

and Rename. Additional Operators: Intersection, Natural Join, Division.

Unit III	<b>Database Design</b> Anomalies in database, Functional Dependencies, Decomposition, Dependency Preservance, Closure of a set of FD, Canonical Cover, Loss-less Join, Armstrong rules, Normal Forms : 1NF, 2NF, 3NF, BCNF, 4NF and 5NF	9	18
Unit IV	<b>Structured Query Language</b> Introduction to SQL, Advantages of using SQL, DDL, DML, Basic and Advanced queries in SQL and Views.	9	10
	<b>Total</b>	<b>36</b>	<b>50</b>

#### Outcomes:

Upon the completion of this course, the student will be able to:

1. Design the database of any application.
2. Access and manipulate data from database efficiently.
3. Apply the concept for advanced DBMS.

#### Reference Books:

- (1) Database Systems- Concepts, Design and Applications, S K Singh, Pearson Education, 1<sup>st</sup> Edition.
- (2) Oracle database 10g SQL, Jason Price, Tata McGraw-Hill Education, 1<sup>st</sup> Edition

#### Additional Reference Books:

- (1) Database Management Systems, Ramakrishnan and Gehrke, Mc Graw -Hill, 3<sup>rd</sup> Edition.
- (2) Database System Concepts, Silberschatz – Korth – Sudarshan, Mc Graw -Hill, 5<sup>th</sup> Edition
- (3) Fundamentals of Database Systems, Elamsri – Navathe, Pearson Education, 4<sup>th</sup> Edition
- (4) SQL, PL/SQL, The Programming Language of ORACLE, Ivan Bayross, BPB Publication, 4<sup>th</sup> Edition.



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### Master of Computer Applications (M.C.A.)

Subject Code: MCA 114

Subject Name: Database Management System - I

Practical per week (hours) : 4

Total Marks (Practical Exam) : 50

#### Topics to be covered in Practical Sessions

Sr. No.	Topics to be Covered	No. of Practicals
1.0	<b>Interactive SQL – I</b> 1.1 Table Fundamentals 1.2 Viewing data in the tables. 1.3 Insert, Update, Delete Operations. 1.4 Rename, Truncate and Drop Tables. 1.5 Synonyms, Sequence.	09
2.0	<b>Interactive SQL – II</b> 2.1 Data Constraints and its types. 2.2 Computation on table data 2.3 Functions	15
3.0	<b>Interactive SQL – III</b> 3.1 Concepts of Grouping 3.2 Sub Queries 3.3 Joins 3.4 Union, Intersection and Minus 3.5 Views.	12
	<b>Total</b>	<b>36</b>



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### Master of Computer Applications (M.C.A.)

#### First Year MCA :

#### Trimester I

**Subject Code:** MCA 114

**Subject Name:** IT Tools

**Lectures per week (hours)** : -  
**Practicals per week (hours)** : 5  
**External Assessment** : 50  
**Total Credits** : 2

**Prerequisite:** None

#### **Aim:**

The course is aimed to bring students from heterogeneous academic streams to a common minimum platform by selectively exposing them to their respective deficiencies and fulfill the prerequisites for some of the subjects of higher trimesters.

#### **Objectives:**

- (1) To understand the Office Productivity tools like MS Word, MS Excel and MS Power Point.
- (2) To understand the concept of Database Management System using MS Access.
- (3) To develop skills for effective development of web based applications using HTML and DHTML.
- (4) To make students aware of common data exchange technology using XML.

#### **Outcomes:**

Upon the completion of this course, the student will be able to:

- (1) Work effectively with Office Productivity Tools.
- (2) Develop small business applications using DBMS software.
- (3) Develop static web sites.
- (4) Apply the knowledge of common data exchange for Enterprise-wide applications.

#### **Reference Books:**

- (1) MS Office 2007 Bible, Groh-Tyson - Prague et al., Wiley, 1<sup>st</sup> Edition
- (2) Mastering HTML, Ray and Ray, BPB, 1<sup>st</sup> Edition
- (3) Learning XML, Ray , Shroff Publications, 1<sup>st</sup> Edition

#### **Additional Reference Books:**

- (1) MS Access 2007 Bible, Groh – Stockman et al., Wiley , 1<sup>st</sup> Edition
- (2) MS Excel 2007 Bible, Walkenbach et al., Wiley , 1<sup>st</sup> Edition
- (3) MS Word 2007 in Simple Steps, Kogent Solutions, Dreamtech, 1<sup>st</sup> Edition
- (4) Study Guide 2007 MS Office, Cox – Preppernau, Dreamtech, 1<sup>st</sup> Edition
- (5) Learn Advanced HTML 4.0 with DHTML, Romalho, BPB, 1<sup>st</sup> Edition
- (6) Teach yourself HTML 4 in 24 hours, Oliver, 4<sup>th</sup> edition.
- (7) Step by Step XML, Young, PHI, 2<sup>nd</sup> Edition (Microsoft Press).



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#### Topics to be covered in Practical Sessions

Sr. No.	Topics to be Covered	No. of Practicals
1	<b>Introduction to office productivity tools</b> <b>Office Productivity Tools</b> 1.1 MS Word 1.1.1 Page Layout Features 1.1.2 References - Table of content, Footnotes, Citation and Bibliography, captions, Index and table of Authorities 1.1.3 Mail merge facility 1.1.4 Review – Track changes, and Proofing 1.1.5 Insertion of different components 1.1.6 Functionality of Macros 1.1.7 Viewing and Designing Features 1.2 MS Excel 1.2.1 Chart 1.2.2 Formulas – Function Library, Define names, formula auditing and calculation Option 1.2.3 Get External data, Sort & filter and data tools. 1.2.4 Protection of sheet and workbook. 1.3 MS Power Point 1.3.1 Creation and designing of slides 1.3.2 Animation 1.3.3 Slide show feature 1.3.4 Presentation of slide show	12
2	<b>DBMS</b> 2.1 MS Access 2.1.1 Database Creation 2.1.2 Tables 2.1.3 Queries 2.1.4 Forms 2.1.5 Reports 2.1.6 Macros	8
3	<b>Web Technology</b> 3.1 HTML 3.1.1 Latest version of HTML Tags 3.1.2 About the different versions of HTML including XHTML 3.1.3 Validation of HTML Web page 3.2 DHTML 3.2.1 Cascading Style Sheet 3.2.2 Introduction to Java Script 3.3 XML 3.3.1 XML Introduction 3.3.2 How to use XML	10
	<b>Total</b>	<b>30</b>



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### Master of Computer Applications (M.C.A.)

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*“The great aim of education is not knowledge but action.”*

**First Year MCA :**

**Trimester II**

**Subject Code:** MCA 121

**Subject:** Data Structures

**Lectures per week (hours)**

: 3 Lectures + 1 Tutorial

**Practicals per week (hours)**

: 3

**Internal Assessment**

: 50 Marks

**External Assessment**

: 50 Theory + 50 Practical Marks

**Total Credits**

: 7

**Prerequisite:** Introduction to Programming using C.

**Aim:**

The course is aimed to introduce the various types of data structures.

**Objectives:**

- (1) To understand the concept of data structures and its applications.
- (2) To write program more efficiently.
- (3) To make students familiar with analysis of algorithms.

<b>Unit No.</b>	<b>Topics to be Covered</b>	<b>No. of Lectures</b>	<b>Marks per Unit</b>
Unit I	<b>Introduction to data structure</b> Primitive & Non-primitive data structures, Operations on primitive data structure, algorithm analysis for time and space requirements. Storage management.(array representation, pointer overview)	6	10
Unit II	<b>Introduction to Sorting and searching</b> <b>Stack and Queue</b> <ul style="list-style-type: none"><li>• Definition of stack, Application of stack,</li><li>• Representation of stack using array and pointer.</li><li>• Operations on stack</li><li>• Definition of queue, Application of queue</li><li>• Representation of queue using array and pointer.</li><li>• Operations on Queue</li><li>• Types of Queue</li></ul>	12	14



Unit III	<b>Linked list.</b>	9	12
	Singly linked list.		
	<ul style="list-style-type: none"><li>• Representation of single linked list.</li><li>• Operations on singly linked list.<ul style="list-style-type: none"><li>○ Insertion as a first node, insertion as a last node, Insertion of a node at specific location.</li><li>○ Deletion of first node, deletion of last node, deletion of a desired node</li><li>○ Searching for the particular element</li><li>○ Sorting the linked list</li><li>○ Reversing the list</li><li>○ Traversing a linked list.</li></ul></li></ul>		
	Doubly linked list		
	<ul style="list-style-type: none"><li>• Representation of doubly linked list.</li><li>• Operations of doubly linked list<ul style="list-style-type: none"><li>○ Insertion as a first node, insertion as a last node, Insertion of a node at specific location.</li><li>○ Deletion of first node, deletion of last node, deletion of a desired node</li><li>○ Searching for the particular element</li><li>○ Sorting the linked list</li><li>○ Traversing a linked list.</li></ul></li></ul>		
	Circular linked list		
	<ul style="list-style-type: none"><li>• Representation of circular linked list</li><li>• Inserting and deleting a node in it.</li></ul>		
Unit IV	<b>Non-linear data structures</b>	9	14
	Trees		
	<ul style="list-style-type: none"><li>• Definition of tree</li><li>• Representation of tree</li><li>• Types of tree</li><li>• Binary tree traversal</li><li>• Storage representation and manipulation of binary tree</li><li>• Conversion of general tree to a binary tree</li><li>• Other representation of tree, application to tree.</li></ul>		
	Graphs		
	<ul style="list-style-type: none"><li>• Introduction, Basic Terminologies</li><li>• Representation of graphs</li><li>• Graph Traversal</li><li>• Application of Graph Structure</li><li>• Finding out the transitive closure and shortest path of Graph</li></ul>		
	<b>Total</b>	<b>36</b>	<b>50</b>



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#### Outcomes:

Upon the completion of this course, the student will be able to:

1. Choose appropriate data structures to solve problems.
2. Write programs efficiently using various data structures.

#### Reference Books:

- (1) An introduction to data structures with their applications, Trembley and Sorenson, TMH (2<sup>nd</sup> edition).
- (2) Data structures using C and C++, Y . Langsam, M. J. Augenstein, A. M. Tenenbaum, PHI (2<sup>nd</sup> edition).

#### Additional Reference Books:

- (1) Data Structures through C, Y. P. Kanetkar, BPB Publications.
- (2) Data Structures and Algorithms: Concepts, Techniques and Applications, GAV Pai, Tata Mc-Graw Hill.

**Subject Code: MCA 121**

**Subject Name: Data Structures**

**Practicals per week (hours) : 4**

**Total Marks (Practical Exam) : 50**

#### Topics to be covered in Practical Sessions

Sr. No.	Topics to be Covered	No. of Practicals
1.0	<b>Introduction to data structure</b>	4
	1.1. Array	
	1.2. Pointers	
	1.3. Bubble sort and selection sort	
	1.4. Sequential Search and Binary Search	
2.0	<b>2.1 Stack</b>	10
	2.1.1. Representation of stack using array	
	2.1.2. Representation using pointer	
	2.1.3. Application of stack	
	<b>2.2 Queue</b>	
	2.2.1. Representation of queue using array	
	2.2.2. Representation using pointer	
	2.2.3. Application of queue	
	2.2.4. Circular queue	
	2.2.5. Dqueue	
	2.2.6. Priority queue	
3.0	<b>Linked list.</b>	10
	<b>3.1 Singly linked list.</b>	
	3.1.1 Representation of single linked list	
	3.1.2 Operations on singly linked list.	
	<ul style="list-style-type: none"><li>• Insertion as a first node, insertion as a last node, Insertion of a node at specific location.</li></ul>	



## AES INSTITUTE OF COMPUTER STUDIES

### Master of Computer Applications (M.C.A.)

- Deletion of first node, deletion of last node, deletion of a desired node
- Searching for the particular element
- Sorting the linked list
- Reversing the list
- Traversing a linked list.
- Splitting list
- Merging list

#### 3.2 Doubly linked list

##### 3.2.1 Representation of doubly linked list.

##### 3.2.1 Operations of doubly linked list

- Insertion as a first node, insertion as a last node, Insertion of a node at specific location.
- Deletion of first node, deletion of last node, deletion of a desired node
- Searching for the particular element
- Sorting the linked list
- Traversing a linked list.

#### 3.3 Circular linked list

##### 3.2.1 Representation of circular linked list

Inserting and deleting a node in it.

4.0

#### Non-linear data structures

12

##### Trees

- Implementation of tree using linked list and array
- Binary tree traversal
- Storage representation and manipulation of binary tree
- Conversion of general tree to a binary tree
- Other representation of tree
- Application of tree.

##### Graphs

- Representation of graphs using Adjacency matrix and linked list
- Graph traversal

#### Total

36