

MCA
Semester-I
Syllabus
Effective
from
June-2020

SUMMARY
MCA SEMESTER - I

Sr.No.	Subject Code	Subject Name	Credit	
			Theory	Practical
1	MCA-101	OBJECT ORIENTED PROGRAMMING USING JAVA (Theory + Practical)	4	2
2	MCA-102	DATA STRUCTURE (Theory + Practical)	4	2
3	MCA-103	SOFTWARE DESIGN PATTERN (GOF) (Theory + Practical)	3	1
4	MCA-104	DATABASE MANAGEMENT SYSTEM (Theory + Practical)	3	1
5	BRIDGE COURSE-1	PROGRAMMING LANGUAGE (“C”)		
6	BRIDGE COURSE-2	WEB TECHNOLOGY		
7	BRIDGE COURSE-3	SYSTEM ANALYSIS AND DESIGN		
8	COMPL-101	GRAMJIVAN PADYATRA	2	
9	COMPL-102	MANNUAL WORK (UDHYOG)	2	
10		COMMUNITY LIVING (SAMUHJIVAN)	GRADE	
Total Credits			18	6
Total Credit : 24				

Gujarat Vidyapith
Department of Computer Sc.
(Faculty of Management and Technology)

MCA SEMESTER - I
MCA - 101 OBJECT ORIENTED PROGRAMMING USING JAVA
(ઓબ્જેક્ટ ઓરીએન્ટેડ પ્રોગ્રામીંગ યુઝીંગ જાવા)

(Effective from - 2020)

Credits:	4 + 2
Objective	This course is designed to give exposure to basic concepts of object-oriented technology. This course will help in learning to write programs in Java using object-oriented paradigm. Approach in this course is to take Java as a language that is used as a primary tool in many different areas of programming work.
Course Outcome	<p>After learning the course, the students should be able to:</p> <ol style="list-style-type: none"> 1. Explain object-oriented programming concepts and implement in java. 2. Comprehend building blocks of OOPs language, define class and object; explain the concept of abstraction and encapsulation. Describes strength of Java language 3. Explain the concepts of Inheritance, Polymorphism, method overloading and overriding, interface, and package and Implements it in java 4. Demonstrate exception handling mechanism, demonstrate use of I/O package 5. Implement multithreading in object-oriented program. 6. Develop programs using JDBC, and Java collection framework 7. explain the model of client/server computing and develop client/server application
Prerequisite	Fundamentals of Programming and Knowledge of Any Programming language

UNIT - I

1 CREDIT

Object Oriented Technology & Java Language Basic

- Paradigm of programming languages, Evolution of Object-Oriented Technology
- **Java Basic:** Introduction to Java Features & Advantages, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Control Statements – If, else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue. Understanding PATH and CLASSPATH, Important Java Packages (Java library), Java tools
- **Array and String:** Single and Multidimensional Array, String class, StringBuffer class, Operations on string, Command line argument, Wrapper classes.

- **Class Fundamentals (Syntax and semantics), Objects and Methods:** Class, Object, Object reference, Constructor, Constructor Overloading, Method and Method Overloading, Recursion, Passing and Returning primitive types and object form Method, new operator, this and static keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class, Abstract class.

UNIT - II

1 CREDIT

- **Inheritance and Polymorphism:** Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, Multilevel Inheritance – method overriding Handle multilevel constructors – super keyword, Stop Inheritance - Final keywords, Interface - Creation and Implementation of an interface, Interface reference, interface inheritance, Dynamic method dispatch, Understanding of Java Object Class, Comparison between Abstract Class and interface
- **Package:** Use of Package, CLASSPATH, Import statement, Static import, Access control
- **Generic:** Generic Introduction, Using Generics in Arguments and Return Types, Generic Methods, Defining Your Own Generic Classes, Generic Interfaces
- **Exception Handling:** Exception and Error, use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class.

UNIT - III

1 CREDIT

- **Multi-Threading and Multithreaded Programming:** An Introduction, Use of Multithread programming, The Main Thread. Java Thread Model, Thread class and Runnable interface, Thread priority, Thread synchronization, Thread communication, Deadlock
- **I/O Programming:** Introduction to Stream, Byte Stream, Character Stream, Readers and Writers, File Class, File Input Stream, File Output Stream, InputStreamReader, OutputStreamWriter, FileReader, FileWriter, Buffered Reader, Console Reading, and Writing
- **Networking with java.net and Client-Server programming:** Basic of Network Concepts, Distributed Environment and Client-Server Architecture, Basic of TCP/IP Protocol suit (IP, TCP and UDP etc.), Understanding Socket and Port, Sockets for Client and Server, InetAddress class, Socket class, ServerSocket class, DatagramSocket class, DatagramPacket class, Socket Programming

UNIT - IV

1 CREDIT

- **Database Handling using JDBC:** Java Database Connectivity, Driver, Driver Types, DriverManager, Connection, Statement, Prepared Statement, Callable Statement, ResultSet, Result set metadata

- **Collection Framework:** Introduction to Java.util package and Collection Framework, Goals and Advantages of Collection Framework, Basic types of collections classes – ArrayList, LinkedList, Iterator, Enumeration, Vector, Stack

LABORATORY WORK - PRACTICAL

2 CREDITS

LAB - MCA - 101 OBJECT ORIENTED PROGRAMMING USING JAVA

Book(s):

Java Fundamentals A comprehensive introduction By Herbert Schildt, Dale Skrien, McGraw Hill Education.

Reference Book(s):

- Object-Oriented Modeling AND DESIGN, JAMES RUMBAUGH, MICHAEL BLAHA; Publication - PHI.
- Object Oriented Software Engineering, Yogesh Shing; Publication – PHI.
- Beginning Java Objects from Concepts to Code, 2nd Edition, Jacquie Barker; Publication – A Press.
- Programming with Java A Primer – E. Balaguruswamy, Mc Graw Hill
- The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, - TMH.
- Core Java Volume-I Fundamentals Horstmann & Cornell, - Pearson Education. - Eight Edition

***** END of MCA – 101 *****

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MCA - SEMESTER – I
MCA-102: DATA STRUCTURE
માહિતીની આંતરિક સંરચના અને ગોઠવણી

(Effective from - 2020)

Credits	4 + 2
Objective	<ul style="list-style-type: none"> • To develop proficiency in the specification, representation and implementation of Data types and Data Structures • To perform various operation like insert, update, search and sorting on various data structures • To carry out the Analysis of various Algorithms for mainly Time and Space Complexity • To get a good understanding of applications of various Data Structures
Course Outcome	<ul style="list-style-type: none"> • Students will get familiar with fundamental data structure, its implementation and algorithm writing • Students will be able to decide a data structure to model any data used in computer applications • Students will be able to assess efficacy tradeoffs among different data structure implementation
Prerequisite	Knowledge of programming language like C, C++ etc.

UNIT - I

1 CREDIT

Introduction to Data Structure

- Data Management concepts
- Data types – primitive and non-primitive
- Performance Analysis and Measurement (Time and space analysis of algorithms- Average, best and worst case analysis)
- Types of Data Structures- Linear & Non Linear Data Structures.

Linear Data Structure:

- **Array**
 - Single dimensional & its addressing function
 - Multidimensional: two & three dimensional
 - Row major & column major representation & addressing functions.
- **Stack**
 - Definition & Concept
 - Operations on stack
 - Applications of Stacks
 - Conversion from infix to postfix
- **Queue**
 - Definition & Concepts
 - Operations on queue
 - Types of queue
 - Circular queue
 - Applications of Stacks priority queues

- Priority queue, Process queue

Linked Linear List

- Sequential & linked allocation, their advantages and disadvantages
- Singly linked list and operations on it
- Double linked list and operations on it
- Circular linked list and operations on it
- Applications of linked list
 - Linked implementation of stack & queue

UNIT - II

1 CREDIT

Non-Linear Data Structure

- **Binary tree**
 - Definition and Concepts
 - Representation
 - Operation Like
 - Traversals : inorder, preorder, postorder
 - Insertion
 - Deletion
 - Copy
 - Searching
- Threaded binary tree
 - Concept
 - Operations like finding successor & predecessor, traversal & insertion
 - Problems in implementation & its solution
- Sequential representation of binary tree
- Some balanced tree mechanism
 - Binary search tree, AVL tree, B tree
 - Height Balance - Weight Balance

UNIT - III

1 CREDIT

- **Graph**
 - Matrix representation of graph
 - Adjacency matrix
 - Path matrix
 - WARSHALL'S algorithm
 - MINIMAL algorithm
 - Adjacency list representation of graph
 - Operations on Graph
 - Breadth First Search
 - Depth First Search
- **Multilinked structure**
 - Sparse matrix
 - Sequential & linked allocation of sparse matrix
 - Matrix addition and multiplication using sparse matrix
- **Dynamic storage management**
 - Fixed block storage allocation
 - First-fit storage allocation

UNIT - IV

1 CREDIT

- **Hashing techniques**
 - The symbol table
 - Hashing Functions
 - Collision Resolution Techniques
- **Sorting methods**

- Bubble Sort
- Insertion Sort
- Quick sort (Partition Exchange sort)
- Radix sort
- Heap sort
- Performance comparison of sorting methods
- **Searching**
 - Linear (sequential Search)
 - Binary Searching
 - Comparison of linear & binary searching

PRACTICAL

2 CREDITS

LAB – DATA STRUCTURE

Practical

- Implementation of algorithms studied about Stack, Queue, Linked List, Tree, Sorting and Searching

Books:-

- An introduction to Data Structures with applications By Tremblay & Sorenson Pub: Tata McGrawHill
- Data Structures - By Tanenbum

Reference Books:-

- Introduction to Data Structure and algorithm with C By Glenn W. Rowe
- “Fundamentals of Data Structures in C by Horowitz, Sahni, Anderson-Freed

***** END of MCA -102 *****

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MCA - SEMESTER – I
MCA-103: SOFTWARE DESIGN PATTERN (GOF)

સોફ્ટવેર ડિઝાઇન પેટર્ન (જીઓએફ)

(Effective from - 2020)

Credits	3+1
Objective	<p>This course will familiarize students with all fundamental and advance techniques of Object-Oriented Analysis design and modelling.</p> <p>Students will</p> <ul style="list-style-type: none"> - Understand the concept of Design patterns and its importance, - Able to use the language of patterns to find and to record solutions to recurring problems of system architecture. - Understand the behavioural knowledge of the problem and solutions. - Relate the Creational, Structural, behavioural Design patterns. - Apply the suitable design patterns to a recurring problem and refine the basic design for given context. <p>This course will lay the ground to implement these patterns in an Object-Oriented language like Java C++ or C#.NET.</p>
Prerequisite	Basic concept of Object-oriented design and familiarity with programming language (Java, C++ or C#.NET)
Outcome	<ul style="list-style-type: none"> - Analyse and design the simple class and object modelling - Identify the appropriate design patterns to solve object-oriented design problems. - Develop design solutions by using creational, structural and Behaviour patterns.

UNIT - I

1 CREDIT

- Object Modeling
 - Introduction to Object Orientation Analysis and Design
 - Object Oriented Development and Themes –
 - Importance of Modelling, principles of modeling
 - Objects, Classes, Class Diagrams
 - Values and Attributes
 - Operations and Methods
 - Link and Association concepts -Links and Associations, Multiplicity, Association and Names, Ordering, Association Classes, Qualified Association
 - Generalization and Inheritance –
 - Aggregation
 - Abstract classes
 - Generalization as extension and Restriction

- Grouping Constructs
- Sample Object modelling

UNIT - II

1 CREDIT

- Design Patterns (GOF)
 - Introduction
 - What is design Pattern?
 - Describing design Patterns
 - The catalog of Design Patterns
 - How to select design pattern and solve design problems
- Creational Patterns
 - Abstract factory
 - Factory Method
 - Singleton
 - Prototype

UNIT - III

1 CREDITS

- Structural Patterns
 - Adapter
 - Decorator
 - Façade
 - Proxy
- Behavioral Patterns
 - Chain of Responsibility Pattern
 - State
 - Strategy
 - Observer
- Case Study

PRACTICAL

1 CREDITS

LAB –GOF- SOFTWARE DESIGN PATTERN (Implementation of Design pattern-based solution using Java, C++ or C#.NET)

Books:-

- Object – Oriented Modeling and Design By James Rumbaugh, Michael Blaha
- Design Patterns Elements of Reusable Object-Oriented Software by Erich Gama, Richard Helm, Ralph Johnson, John Vlissides pub. Pearson Education

Reference Books:-

- Head First Object –Oriented Analysis & Design, Brett D. McLaughlin, Gary Pollice & David West, Pub. O'REILLY
- Head First Design Pattern, Eric Freeman & Elisabeth Freeman, Pub. O'REILLY

Online Courses :-

- <https://www.edulib.in//userLib/subjectTopics/553>

***** END of MCA -103 *****

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MCA - SEMESTER – I
MCA-104: Database Management System

ડેટાબેઝ મેનેજમેન્ટ સિસ્ટમ

(Effective from - 2020)

Credits	3 + 1
Objective and	Understand architecture of DBMS, Design database, table and attributes. Normalization of table is important part for that. This part of the paper also covers concurrency problems and its solution. Use knowledge practically in SQL.
Course Outcome	After learning the course, the students should be able to: 8. Understand database management system architecture. 9. Create and manage database with all integrity constraints. 10. Refine the scheme of database by applying normal forms. 11. Recover the database from failures from concurrency problems. 12. Create views, procedures and triggers on databases.
Prerequisite	Knowledge of data storing using File and file system implementation.

UNIT - I

1 CREDIT

Architecture of DBMS

- The Three Levels of the Architecture
- The External Level
- The Conceptual Level
- The Internal Level
- Mappings
- The Database Administrator
- The Database Management System
- Candidate Keys, Primary Keys, Alternate Keys, Foreign Keys
- ER Diagram

UNIT - II

0.5 CREDIT

Database table Normalization

- Non-loss Decomposition and Functional Dependencies
- First, Second, Third, Fourth and Fifth Normal Forms
- Dependency Preservation
- Boyce/Codd Normal Form

UNIT - III

1 CREDIT

Two-Phase Commit, Concurrency Problems, Locking and Isolation

- Two-Phase Commit, SOL Support
- Three Concurrency Problems
- Locking
- The Three Concurrency Problems Revisited
- Deadlock,
- Serializability,
- Level of Isolation,

- Intent Locking

UNIT - IV

0.5 CREDIT

SQL

- Database creation & management
- Table creation and management
- Query on tables (select, insert, delete, update statement)
- Triggers

LABORATORY WORK - PRACTICAL

1 CREDIT

LAB - MCA - 104 SQL

Book(s):

1. An Introduction to Database Systems by C.J.Date, A. Kannan, S. Swamynathan
Publisher Pearson, 8th edition

Reference Book(s):

1. An Introduction to Database Management System By - Bipin Desai, Publisher PHI,
Edition second
2. Database System Concepts By - Avi Silberschatz, Henry Korth,
S.Sudarshan, Publisher McGraw-Hill, Edition 5th.

***** END of MCA -104 *****

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MCA SEMESTER - I
BRIDGE COURSE – I

PROGRAMMING LANGUAGE (“C”)

संक्रमादेश भाषा (“सी”)

(Effective from - 2020)

Hours	15
Objective	Understand how to develop logic for computer programming. It includes iterative programming and other programming methods. This part of the paper also covers topics like input-output, control statements, control loops, structure and pointers,
Prerequisite	No prerequisite for this paper

UNIT - I

- Logic development using flowchart
- Iterative methods for developing algorithms/flowcharts
- An Introduction to declarations, Assignments & variables.
- Making decision in C
 - If else statement
- Control loops
 - While loop
 - do while loop
 - for loop
- scanf & printf functions.
- Continue and break Statement
- User defined functions.
- array
- Strings

Practical

LAB - INTRODUCTION TO PROGRAMMING (“C”)

Book(s):

1. The Let us C, by Yashwant Karnitkar, Publisher Infinity Science Press; 8th Revised edition

Reference Book(s):

1. The C Programming language By Ritchie and Kernighan Publisher PHI, Edition second
2. C How to program By Deitel and Deitel, Publisher Prentice Hall
3. Introduction to C Programming by Reema Thareja Publisher Oxford university press

***** END of Bridge Course - I *****

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MCA SEMESTER - I
BRIDGE COURSE- II

Web Technology

વેબ ટેકનોલોજી

(Effective from - 2020)

Hours	15
Objective	A bridge course for students who are from non-computer field.
Prerequisite	Basic knowledge of working with computers

UNIT - I

- **HTML**
 - Basics of HTML, formatting and fonts, commenting code,
 - Color, hyperlink, lists, tables, images, forms,
 - Frames and frame sets.
- **CSS**
 - Need for CSS, introduction to CSS,
 - Basic syntax and structure, using CSS,
 - Background images, colors and properties
 - Manipulating texts, using fonts, borders and boxes, margins
 - Padding lists, Animations
- **JavaScript**
 - Client side scripting with JavaScript
 - Variables, functions
 - Conditions, loops and repetition,
 - Pop up boxes,

Reference Books:-

- Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India
- Web Enabled Commercial Application Development Using Html, Javascript, Dhtml & Php by Ivan Bayross

Web Resources:-

- <http://www.w3schools.com/>

Course Outcome:-

After Completion of this course students will be able to

1. List various HTML tags and use them to develop user friendly web pages
2. Define the CSS with its types and use them to provide the styles to the web pages at various levels
3. Use the JavaScript to develop the dynamic web pages

***** END of Bridge Course – II *****

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MCA SEMESTER - I
BRIDGE COURSE – III

SYSTEM ANALYSIS AND DESIGN

પ્રણાલીનું વિશ્લેષણ અને અભિકલ્પના

(Effective from - 2020)

Hours	15
Objective	The student will be able to use System Analysis and Design models and techniques to determine and specify software requirements and can develop software and Information Technology architecture for any type of organization.

UNIT - I

- **Project Management**
 - Project Plan
 - Managing Project
 - Estimation
- **System Analysis**
 - Requirements Determination
 - Techniques
 - Feasibility Analysis
 - Hardware and Software Requirements
- **System Design**
 - Data Flow Diagram
 - Data Dictionary
 - Design of Input and Output
 - Cohesion
 - Coupling
- **System Testing**
 - About Software Testing
 - Software Verification Techniques
 - Checklist
 - State based Testing
 - Design of Test Cases

Text Book:

- Analysis and Design of Information Systems by James A. Senn Publisher: McGraw Hill
- System Analysis and Design by Dennis, Wixom and Roth Publisher: Wiley

***** END of Bridge Course – III *****