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DEPARTMENT OF COMPUTER APPLICATIONS

CBCS CURRICULUM

MASTER OF COMPUTER APPLICATIONS

PROGRAMME CODE - MC

COURSE STRUCTURE

(w.e.f. 2020 – 2021 onwards)

Annexure-25

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A

COURSE STRUCTURE - SEMESTER WISE

(w.e.f. 2020-2021 Batch Onwards)

Sem	Sub. Code	Title of the Paper	Teaching Hours/ Week	Duration of exam (hrs)	Marks Allotted			Credits
					C.A	S.E	Total	
1	20MC11	Mathematical Foundation of Computer Application	4	3	25	75	100	4
	20MC12	Object Oriented Programming using C++	4	3	25	75	100	4
	20MC13	Relational Database Management Systems	4	3	25	75	100	4
	20MC14	Advanced Data Structures	4	3	25	75	100	4
	20MC15	Operating Systems	4	3	25	75	100	4
	20MC11P	Data Structures using C ++ Lab	5	3	40	60	100	3
	20MC12P	RDBMS Lab	5	3	40	60	100	3
2	20MC21	Open Source Technology	4	3	25	75	100	4
	20MC22	Programming in Java	4	3	25	75	100	4
	20MC23	Data Communications and Networking	4	3	25	75	100	4
	20MC24	Data Mining and Data Warehousing	4	3	25	75	100	4
		Elective - I	4	3	25	75	100	4
	20MC21P	Open Source Technology Lab	5	3	40	60	100	2
	20MC22P	Java Programming Lab	5	3	40	60	100	3
3	20MC31	Web Technologies	4	3	25	75	100	4
	20MC32	Python Programming	4	3	25	75	100	4
	20MC33	Mobile Computing	4	3	25	75	100	4

	20MC34	Cryptography and Network Security	4	3	25	75	100	4
		Elective – II	4	3	25	75	100	4
	20MC31P	Web Technologies Lab	5	3	40	60	100	3
	20MC32P	Python Programming Lab	5	3	40	60	100	2
4	20MC41	Big Data Analytics	4	3	25	75	100	4
	20MC42	Machine Learning	4	3	25	75	100	4
	20MCPR4	Project - Viva Voce		Viva	40	60	100	6
Total			98					90

Electives:

Semester II

Elective – I (Choose any One)

1. Software Engineering - 20MCE2A
2. Cloud Computing - 20MCE2B
3. Enterprise Resource Planning - 20MCE2C

Semester III

Elective – II (Choose any One)

1. Internet Of Things - 20MCE3A
2. Principles of Compiler Design - 20MCE3B
3. Soft Computing - 20MCE3C

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A

(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper:		**Mathematical Foundation of Computer Application**		
Semester	**:**	**I**	**Contact Hours**	**: 4**
Sub Code	**:**	**20MC11**	**Credits**	**: 4**

Objectives:

To be aware of different concept like logic, graph theory, Set Theory , Functions, Lattices and Boolean Algebra.

Unit - I

Functions: Function and Operators – One-to-One – Onto function – Special Types of functions – Invertible functions – Composition of functions.

Unit - II

Set Theory: Introduction – Sets – Notation And Description of sets – Subsets – Venn-Euler Diagram – Operations on sets, Properties of set operations – Verification of the basic laws of algebra by Venn diagrams – The Principle of Duality.

Unit - III

Mathematical Logic : Connectives – Atomic and compound statements Well formed(statement) Formulae – Truth table of a Formula – Tautology – Tautological Implications and equivalence of formulae – Replacement process – Functionally complete Sets of connectives and Duality Law - Normal forms.

Unit - IV

Lattices and Boolean Algebra: Lattices – Some properties of lattices – New lattices – Modular and Distributive Lattices – Boolean algebras – Boolean Polynomials .

Unit - V

Graph Theory : Basic Concepts - Trees – Some Properties of trees – Pendant Vertices in a Tree – Distance and Centres in a Tree – Rooted and Binary trees – On Counting Trees – Spanning Trees – Fundamental Circuits – Cutsets – Some Properties of Cutset –

All Cutsets in graph – Fundamental circuits and Cutsets – Connectivity and Separability – Network flows.

Text Books:

1.Dr. M.K. Venkataraman , Dr. N. Sridharan , N. Chandrasekaran ., *Discrete Mathematics* , The National Publishing Company , 6th Edition , 2009.

Chapters:

Unit - I : 3.1 - 3.5

Unit – II : 1.1 - 1.9

Unit – III : 9.3 - 9.11

Unit - IV : 10.1 - 10.6

2. Narsingh Deo , *Graph Theory with Applications to Engineering and Computer Science* , Prentice Hall of India , 3rd Edition , 2005.

Chapters:

Unit - V : 3.1 - 3.8 , 4.1 - 4.6

Reference Books:

1. Tremblay J.P., and Manohar R.P, *Discrete Mathematical Structures with Applications to Computer Science* , McGraw Hill , 2nd Edition , 2012

2. Seymour Lipschutz, Marc Lars Lipson, Adapted by Varsha Patil, *Discrete Mathematics,* McGraw Hill Education (India) Private Limited New Delhi, 3rd Edition, 2013

3. Seymour Lipschutz, *Schaums Outline of Set Theory and Related Topics* , 2nd Edition , 2019

4. Oscar Levin, *Discrete Mathematics : An Open Introduction,* 3rd Edition, 2019

5. Jean-Paul Tremblay , *Logic And Discrete Mathematics,* Pearson Education, 3rd Edition, 2011

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A

(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper	**:**	**Object Oriented Programming using C++**	
Semester	**:**	**I**	**Contact Hours : 4**
Subject Code	**:**	**20MC12**	**Credits : 4**

Objective:

To study the concept of C++ , Arrays , Pointers , References and the Dynamic Allocation , Operator Overloading , Inheritance , Exception Handling .

Unit - I

Introduction to C++ : Evolution of C++ - ANSI Standard - Preface to Object-Oriented Programming – Key Concepts of Object-Oriented Programming – Advantages of OOP – Object –Oriented Languages – Usage of OOP . **Input and Output in C++ :** Pre-Defined Streams – Stream Classes – Formatted and Unformatted Data – Unformatted Console I/O Operations – Formatted Console I/O Operations — Manipulators – User - Defined Manipulators . **C++ Declarations :** Tokens – Variable Declaration and Initialization – Data Types in C++ - Scope Access Operator – Memory Management Operators – Comma Operator.

Unit - II

Functions in C++ : Introduction - Parts of Function – Passing Arguments – Return by Reference – Returning More Values by Reference – Default Arguments – Const Arguments – Inline Functions – Function Overloading – Principles of Function Overloading .**Classes and Objects:** Introduction – Structures in C++ - Classes in C++ - Declaring Objects – The Public, Private, Protected Keywords – Defining Member Functions and its Characteristics- Outside Member Function as Inline – Rules for Inline functions – Data Hiding or Encapsulation – Classes, Objects and Memory – Static Member Variables and Functions – Static Object – Array of Objects – Objects as Function Arguments – Friend Functions – Overloading Member Functions .

Annexure-25

Unit - III

Constructors and Destructors : Introduction – Constructors and Destructors and its Characteristics – Constructors with Arguments – Overloading Constructors – Constructors with Default Arguments – Copy Constructors – Destructors – Calling Constructors and Destructors – Dynamic Initialization using Constructors. **Operator Overloading and Type Conversion :** Introduction – The Keyword Operator – Overloading Unary Operators – Overloading with friend Function – Type Conversion – Rules for Overloading Operators .

Unit - IV

Inheritance: Introduction – Access Specifiers and Simple Inheritance – Protected Data with Private Inheritance – Types of Inheritances – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Multipath Inheritance – Virtual Base Classes – Constructors, Destructors and Inheritance - Object as a Class Member – Abstract Classes .**Binding, Polymorphism and Virtual Functions :** Introduction – Binding in C++ - Pointer to Base and Derived Class Objects – Virtual Functions – Rules for Virtual Functions – Array of Pointers – Pure Virtual Functions – Abstract Classes – Working of Virtual Functions – Virtual Functions in Derived Classes– Constructors and Virtual Functions – Virtual Destructors – Destructors and Virtual Functions.

Unit – V

Application with Files : Introduction – File Stream Classes – Steps of File Operations – Checking for Errors – Finding End of a File – File Opening Modes – File Pointers and Manipulators – Sequential Access Files – Random Access Operation – Command Line Arguments. **Exception Handling :** Introduction – Principles of Exception Handling – The Keywords *try, throw* and *catch* – Guidelines for Exception Handling – Multiple Catch Statements – Catching Multiple Exceptions – Rethrowing Exception – Exceptions in Constructors and Destructors – Exception and Operator Overloading – Exception and Inheritance – Class Template with Exception Handling.

Annexure-25

Text Book:

Ashok N Kamthane, *Programming in C++*, Pearson Education, 2nd Edition, 2017.

Chapters :

Unit – I : 1.2 , 1.3 , 1.7 to 1.11 , 3.3 , 3.5 to 3.7 , 3.10 , 3.13 , 3.14 , 4.2 to 4.10,

Unit – II : 7.1 to 7.3 , 7.5 to 7.8 , 7.10 to 7.12 ,8.1,8.3 to 8.21 , 8.29

Unit - III : 9.1 to 9.3 , 9.5 , 9.6 , 9.8 , 9.9 , 9.11 , 9.12 , 9.16 , 10.1 to 10.3 , 10.7 , 10.9 , 10.10

Unit – IV : 11.1 to 11.15 , 15.1 to 15.4 , 15.6 to 15.10 , 15.12 to 15.14

Unit – V : 16.1 to 16.7 , 16.9 , 16.11 , 16.13 , 19.1 to 19.7 , 19.9 , 19.11 to 19.13

Reference Books :

1. Balaguruswamy, Object Oriented Programming with C++, 7th Edition, Tata McGraw-Hill, New Delhi 2017.
2. Reema Thareja , Object Oriented Programming with C++ , Oxford University Press , Revised First Edition 2018
3. Yashwant Kanetkar, *Let us C++*, BPB Publications, Eleventh edition, 2019.
4. Rohit Khurana , *Object Oriented Programming with C++* , Vikas Publishing House , 2nd Edition , 2014
5. Jana Debasish , *C++ and Object Oriented Programming Paradigm* , PHI , 3rd Edition , 2014

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A

(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper	**:**	**Relational Database Management Systems**	
Semester	**:**	**I**	**Contact Hours : 4**
Sub Code	**:**	**20MC13**	**Credits : 4**

Objectives:

To acquire knowledge on how data is processed at time of necessity in a desired manner.

Unit- I :

Introduction : Database System Applications – Purpose of Database Systems –View of Data – Database Languages – Relational databases - Database Design –Data storage and querying – Transaction Management - Database Architecture – Database Users and Administrators - History of Database Systems. **Relational Databases:** Introduction to the Relational Model : Structure of Relational Databases – Database Schema – Keys – Schema Diagrams Relational Query Languages – The Relational Operations.

Unit- II :

Introduction to SQL: SQL Data Definition – Basic Structure of SQL Queries- Additional Basic Operations - Set Operations – Null Values - Aggregate functions. **Advanced SQL:** Accessing SQL From a Programming Language – Functions and Procedures – Triggers - Recursive Queries – Advanced Aggregation Features.

Unit -III :

Database Design and the E-R Model : Overview of the Design Process – The Entity–Relationship Model - Constraints - Removing Redundant Attributes in Entity Sets- Entity - Relationship Diagrams – Reduction to Relational Schemas- Entity Relationship Design Issues - Extended E-R Features – **Relationship Database Design** : Decomposition

using Functional Dependencies – Functional Dependency Theory – Decomposition using Multivalued Dependencies.

Unit- IV :

Data Storage and File Structure : File Organization – Organization of Records in Files – Data-Dictionary Storage , Database Buffer. **Indexing and Hashing** : Basic Concepts -Ordered Indices – B+-Tree Index Files – B+-Tree Extensions – Multiple-key Access - Static Hashing - Dynamic Hashing – **Query Optimization** : Transformation of Relational Expressions – Estimating Statistics of Expression Results.

Unit -V :

Transactions : Transaction concept –A Simple Transaction Model –Storage Structure – Transaction Atomicity and Durability – Transaction Isolation – Serializability- **Concurrency Control** : Lock-based Protocols – Deadlock Handling -Time stamp-Based Protocols –Validation–Based Protocols – . **Recovery System**: Failure Classification - Storage – Recovery and Atomicity – Recovery Algorithm – Buffer Management.

Text Book :

AbrahamSilberschatz, HenryzF.Korth,, S.Sudarshan *Database System Concepts* , Mc Graw Hill International Edition, ,6th Edition ,2011

Chapters:

Unit - I **:** 1.1 to 1.9, 1.12,1.13, ,2.1 to 2.6 ,

Unit - II **:** 3.2 to 3.7 , 5.1 to 5.5

Unit - III **:** 7.1 to 7.8 , 8.3,8.4,8.6

Unit - IV **:** 10.5 to 10.8, 11.1 to 11.7 , 13.2,13.3.

Unit - V **:** 14.1 to 14.6, 15.1,15.2 ,15.4,15.5 , 16.1 to 16.5

Reference Books:

1. G.K. Gupta, *Database Management Systems*, McGraw Hill Education, 4th reprint 2015.
2. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, *Database System Concepts*, McGraw Hill, 6th Edition, 2010.
3. R.Pannerselvam, *Database Management Systems*, PHI Learning, 2nd Edition, 2015.
4. R.Elmasri and S.B.Navathe, *Database Systems Models, Languages, Design and Application Programming*, Pearson Education, 6th Edition, 2013.
5. Carlos Coronel , Steven Morris , Peterrob , *Database Systems : Design, Implementation and Management* , Cengage Learning , 10th Edition , 2012.

Annexure-25

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A

(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper	**:**	**Advanced Data Structures**		
Semester	**:**	**I**	**Contact Hours**	**: 4**
Subject Code	**:**	**20MC14**	**Credits**	**: 4**

Objective:

To improve the skills in the area of Data Representation, Stacks, Queues, Hashing, Priority Queues, Hashing, Search Trees, Graphs.

Unit - I

Arrays: Abstract Data Types and the C++ Class: An Introduction to the C++ Class - Data Abstraction and Encapsulation in C++ - Declaring Class Objects and Invoking Member Functions - Special Class Operations - ADTs and C++ Classes. The Array as an Abstract Data Type . The Polynomial Abstract Data Type - Polynomial Representation - Polynomial Addition. Representation of Arrays. The String Abstract Data Type- String Pattern Matching: A Simple Algorithm. **Stacks and Queues:** Templates in C++: Template Functions - Using Templates to Represent Container Classes. The Stack Abstract Data Type - The Queue Abstract Data Type. Evaluation of Expressions: Expressions - Postfix Notation - Infix to Postfix.

Unit - II

Linked Lists: Singly Linked Lists and Chains - Representing Chains in C++: Defining a Node in C++ - Designing a Chain Class in C++ - Pointer Manipulation in C++. Circular Lists . Linked Stacks and Queues. Doubly Linked Lists. **Hashing :** Introduction - Static Hashing - Hash tables - Hash Functions - Secure Hash Functions . Dynamic Hashing - Motivation for Dynamic Hashing -Dynamic Hashing using Directories - Directoryless Dynamic Hashing.

Unit - III

Trees: Introduction: Terminology - Representation of Trees. Binary Trees: The Abstract Data Type - Properties of Binary Trees - Binary Tree Representations. Binary Tree

Traversal and Tree Iterators: Introduction - Inorder Traversal - Preorder Traversal - Postorder Traversal. Threaded Binary Trees : Threads , Inorder Traversal of a Threaded Binary Tree ,Inserting a Node into a Threaded Binary Tree. Heaps: Priority Queues - Definition of a Max Heap - Insertion into a Max Heap - Deletion from a Max Heap. Binary Search Trees : Definition , Searching a Binary Search Tree , Insertion into a Binary Search Tree ,Deletion from a Binary Search Tree.

Unit - IV

Graphs : The Graph Abstract Data Type: Introduction - Definitions - Graph Representations. Elementary Graph Operations: Depth First Search - Breadth First Search - Connected Components - Spanning Trees . Minimum Cost Spanning Trees: Kruskal's Algorithm – Prim's Algorithm. **Sorting:** Motivation - Insertion Sort - Quick Sort . Merge Sort: Merging - Iterative Merge Sort - Recursive Merge Sort . Heap Sort.

Unit - V

Efficient Binary Search Trees: Optimal Binary Search Trees - AVL Trees - Red-Black Trees : Definition - Representation of a Red-Black Tree - Searching a Red-Black Tree - Inserting into a Red-Black Tree - Deletion from a Red-Black Tree . **Multiway Search Trees:** *m*-way Search Trees - Definition and Properties - Searching an *m*-way Search Trees - B-Trees : Definition and Properties - Number of Elements in a B-Tree - Insertion into B-tree - Deletion from a B-tree.

Text Book:

Ellis Horowitz , Sartaj Sahni , Dinesh Mehta , *Fundamentals of Data Structures in C++* ,Universities Press , 2nd Edition , 2017.

Chapters :

Unit – I : 2.1: 2.1.1 -2.1.4 , 2.1.6 , 2.2 , 2.3 , 2.5 , 2.6- 2.6.1 , 3.1 , 3.2 , 3.3 , 3.6

Unit – II : 4.1 , 4.2 : 4.2.1 - 4.2.3 ,4.4 ,4.6 , 4.10 , 8.1 , 8.2 : 8.2.1- 8.2.3 , ,8.3

Unit – III : 5.1 , 5.2 ,5.3 : 5.3.1 – 5.3.4 , 5.5 , 5.6 , 5.7 :5.7.1 - 5.7.4

Unit – IV : 6.1 , 6.2 : 6.2.1 -6.2.4 , 6.3 : 6.3.1 , 6.3.2 , 7.1 , 7.2 ,7.3 ,7.5 , 7.6

Unit - V : 10.1 , 10.2 ,10.3 : 10.3.1 -10.3.5 , 11.1 ,11.2.

Annexure-25

Reference Books:

1. Seymour Lipschutz , *Data Structures* , McGraw Hill Education , Revised First Edition , 2017
2. Mark , Allen Weiss , *Data Structures and Algorithms Analysis in C++* , Pearson Education , 3rd Edition , 2014
3 .G.A.V.Pai , *Data Structures and Algorithms: Concepts - Techniques and Applications,* Tata McGraw-Hill Education , 2017
4. Michael T.Goodrich ,Roberto Tamassia , David M.Mount , *Data Structures and Algorithms in C++* , 2nd Edition , 2011
5. Adam Drozdek , *Data Structures and Algorithms in C++* , Cengage Publications , 4th Edition , 2013.

Annexure-25

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A

(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper : Operating Systems
Semester : I **Contact Hours : 4**
Subject Code : 20MC15 **Credits : 4**

Objective:

To develop the skills in the area of Operating System, Process Management, Process Synchronization, Memory Management, File system interface, Mask Storage Structure.

Unit – I

Introduction: What Operating Systems Do – Computer System Organization- Computer System Architecture – Operating System Structure – Operating System Operations – Open Source Operating Systems – **Operating System Structures:** Operating System Services – User Operating System Interface – System Calls – Types of System Calls – System Programs.

Unit – II

Processes: Process Concept – Process Scheduling – Operation on process –Inter process communication – Communication in Client Server Systems - **Threads:** Overview- Multithreading Models – Thread Libraries – Threading Issues – **CPU Scheduling:** Basic Concepts - Scheduling Criteria – Scheduling Algorithms. Thread Scheduling-Multiple Processor Scheduling.

Unit – III

Synchronization: Background - The Critical Section Problem - Peterson's Solution – Synchronization Hardware – Semaphores – Classic Problems – Monitors –Synchronization Examples-Deadlocks: System Model -Deadlock Characterization -Methods for Handling Deadlocks- Deadlock Prevention-Deadlock Avoidance- Deadlock Detection-Recovery from Deadlock.

Annexure-25

Unit –IV

Main Memory: Background- Swapping- Contiguous Memory allocation - Segmentation - Paging-Structure of the Page Table-**Virtual Memory :** Background –Demand Paging-Copy on Write – Page Replacement - Allocation of Frames - Thrashing.

Unit-V

File System : File concepts – Access methods – **File System Implementation :** File System Structure – Allocation Methods - Free Space Management - **Mass-Storage Structure :** Overview of Mass Storage Structure – Disk Structure – Disk Scheduling – Disk Management – Swap Space Management.

Textbook:

Silberschatz Galvin, *Operating System Concepts* ,John Wiley & Sons, New Delhi, 9th Edition, 2011.

Chapters:

Unit-I : 1.1 to 1.5, 1.12, 2.1 to 2.5.

Unit-II : 3.1 to 3.6, 4.1, 4.3, 4.4, 4.6 to 4.7, 5.1 to 5.5.

Unit-III : 6.1 to 6.9, 7.1 to 7.7.

Unit-IV : 8.1 to 8.6 , 9.1 to 9.6

Unit-V : 10.1,10.2,11.1,11.4 to 11.5, 12.1, 12.2, 12.4 to 12.6

Reference Books:

1. S Halder, Alex, A Aravind, Operating System, Pearson Education, 2nd Edition, 2016.
2. Dhananjay Dhamdhere, *Operating Systems a Concept-Based Approach* ,Tata McGraw Hill Education , India, 3rd Edition,2017.
3. Andrew S. Tanenbaum Herbert Bos, *Modern Operating Systems* , Pearson Education, India, 4th Edition, 2015.
4. Pramod Chandra Bhatt, *An Introduction to Operating Systems*, Concepts and Practice, PHI Learning Pvt.Ltd., Delhi, 4th Edition,2014.
5. WilliamStallings, *Operating Systems: Internals and Design Principles*, Pearson Education, India,7thEdition,2012.

Annexure-25

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper : Data Structures using C++ Lab
Semester : I **Contact Hours : 5**
Subject Code : 20MC11P **Credits : 3**

Program List :

1) Write a program to find the following in a one dimensional array:
    1. Find Maximum of N numbers.
    2. Find Minimum of N numbers.
    3. Find Summation of N numbers.
    4. Find Average of N numbers.
2) Write a program for calculating matrices operations:
    1. Addition
    2. Subtraction
    3. Multiplication
    4. Transpose of matrices
    5. Row wise, column wise and diagonal wise total.
    6. Symmetric Checking.
3) Write a program to do the following:
    1. String copy
    2. String concatenation
    3. String comparison
    4. String reverse
    5. Find the length of the string
    6. String Conversion (Uppercase to Lowercase and Lowercase to Uppercase)
4) Write a program for manipulating single linked list.
5) Write a program to manipulate double linked list.

Annexure-25

6) Write a program to manipulate circular double linked list.

7) Write a program for demonstrating any application of stack.

8) Write a program for demonstrating any application of queue.

9) Write a program to perform operations on binary tree.

10) Write a program for sorting by using the concept sorting by Insertion

11) Write a program for sorting by using the concept sorting by Selection

12) Write a program for sorting by using the concept sorting by Merging

13) Write a program for sorting by using the concept sorting by Exchange

14) Write a program for search by using Linear Search Techniques

15) Write a program for search by using Non-linear Search Techniques

Annexure-25

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A

(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper	**:**	**RDBMS Lab**		
Semester	**:**	**I**	**Contact Hours**	**: 5**
Subject Code	**:**	**20MC12P**	**Credits**	**: 3**

Program List :

1. DDL Commands Illustration
2. DML Commands Illustration

   PL /SQL
3. Program using Conditional control , Iterative control and Sequential Control .
4. Program using Exception Handling
5. Program using Implicit and Explicit Cursors.
6. Program using Pl/SQL tables and record.
7. Program using Database triggers.
8. Program to design procedures using in , out , in out parameter.
9. Program to design procedures using recursion.
10. Program to design procedures using packages.
11. Program to design procedures using packages.
12. Program to design database Connection for Insertion of record.
13. Program to design database Connection for Deletion of record.
14. Program to design database Connection for Updating of record.
15. Program to design database Connection for Multiple record.

Annexure-25

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A

(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper	**: Open Source Technology**	
Semester	**: II**	**Contact Hours : 4**
Sub Code	**: 20MC21**	**Credits : 4**

Objective:

To acquire knowledge about PHP and to implement it to develop Web Applications.

Unit – I

What is PHP – What is MySQL – Deciding on a Web Application Platform .**Server-Side Scripting Overview :** Static HTML – Client-Side Technologies – Server-Side Scripting . **Learning PHP Syntax and Variables :** PHP Syntax – Comments – Variables – Types in PHP – The Simple Types – Doubles – Booleans – NULL – Strings – Output .

Unit – II

PHP Control Structures and Functions : Boolean Expressions – Branching – Looping – Using Functions – Function Documentation – Own Functions – Functions and variable Scope – Function Scope. **PHP String Handling :** Strings in PHP , String Functions .

Unit - III

Learning Arrays : Uses of Arrays – Creating Arrays – Retrieving Values – Multidimensional Arrays – Inspecting Arrays – Deleting from Arrays – Iteration . **PHP Number Handling :** Numerical Types – Mathematical Operators – Mathematical Functions .

Unit – IV

Introducing Databases And MySQL : What is a Database – Why a Database - PHP-Supported Databases . **Structured Query Language (SQL) :** Relational Databases and SQL – SQL Standards – SQL – Database Design – Privileges Security. **Database Administration and Design :** MySQL Client Commands – MySQL User Administration – Backups – Replication – Recovery .

Annexure-25

Unit – V

Performing Database Queries : HTML Tables and Database Tables – Complex Mappings – Creating sample Tables . **Integrating Web Forms and Databases :** HTML Forms – Basic Form Submission to a Database – Editing Data with an HTML Form . **Improving Database Efficiency :** Connections – Indexing and Table Design .

Text Book :

Steve Suehring , Tim Converse and Joyce Park , *PHP6 and MySQL* , Wiley Publishers , 3rd Edition , 2014 .

Chapters:

Unit - I	**:** 1 , 2 , 4
Unit - II	**:** 5 , 7
Unit - III	**:** 8 , 9
Unit - IV	**:** 11 , 13 , 14
Unit - V	**:** 16 , 17 , 18

Reference Books:

1. Tom Butler , Kevin Yank , *PHP & MySQL Novice to Ninja,* Sitepoint , 6th Edition , 2017
2. Luke Welling , Laura Thomson , *PHP and My SQL Web Development* , Addison-Wesley , 5th Edition 2017.
3. Robin Nixon , *Learning PHP, MySQL & JavaScript with j Query, CSS & HTML5,* O Reilly , 4th Edition, 2015.
4. Apache , *Beginning PHP6 MySQL Web Development* , Wiley , 2nd Edition , 2014.
5 . Joel Murach, Ray Harris , *Murach's PHP & MySQL* **,** Mike Murach & Associates Inc., 2nd Edition ,2014

Annexure-25

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper : Programming in Java
Semester : II **Contact Hours : 4**
Sub Code : 20MC22 **Credits : 4**

Objective:

To imbibe knowledge about Java Language to develop an application program in Java**,** Exception handling, RMI, Swing.

Unit – I

Data Types , Variables and Arrays: Integers - Floating-Point Types – Characters – Booleans - Variables . **Operators :** Arithmetic Operators - The Bitwise Operators - Relational Operators - Boolean Logical Operators. **Control Statements**: Java's Selection Statements - Iteration Statements - Jump Statements . **Introducing Classes**: Class Fundamentals - Declaring Objects - Introducing Methods - Constructors.

Unit - II

Inheritance: Inheritance Basics - Using Super - Creating a Multi Level Hierarchy . **Packages and Interfaces:** Packages - Access Protection - Importing Packages - Interfaces . **Exception Handling :** Exception Handling Fundamentals - Exception Types - Uncaught Exceptions - Using try And catch - Multiple catch Clauses - Nested try Statements .

Unit– III

Multithreaded Programming: The Java Thread Model – The Main Thread – Creating a Thread – Creating Multiple Threads - Thread Priorities – Synchronization – Inter thread Communication .**Input /Output: Exploring java.io:** File – The Stream Classes – The Byte Streams – The Character Streams. **The Applet Class:** Applet Basics - Applet Architecture - An Applet Skeleton - Simple Applet Display Methods - The HTML APPLET Tag.

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Unit – IV

Event Handling: The Delegation Event Model – Event Classes – Sources of Events – Event Listener Interfaces **. Introducing the AWT : Working With Windows , Graphics and Text :** AWT Classes - Window Fundamentals – Introducing Graphics - Working with Color **. Using AWT Controls, Layout Managers and Menus :** Labels - Using Buttons – Applying Check Boxes - Using Lists - Using a TextField - Using a TextArea – Understanding Layout Managers.

Unit – V

Introducing GUI Programming with Swing : **Introducing Swing :** Components and Containers - The Swing Packages - A Simple Swing Application. **Exploring Swing** : JLabel and ImageIcon – JtextField - The Swing Buttons - JTabbedPane – JScrollPane – Jlist - JComboBox – Trees - JTable. **Networking :** Networking Basics - The Networking Classes and Interfaces - InetAddress - Inet4Address and Inet6Address - TCP/IP Client Sockets - URL - URL Connection - HttpURL Connection - The URL Class - Cookies - TCP / IP Server Sockets - Datagrams.

Text Books:

Herbert Schildt , *The Complete Reference - Java*^{TM} , Tata McGraw Hill , 9th Edition , 2014.

Chapters:

Unit - I : 3 , 4 , 5 , 6

Unit - II : 8 , 9 , 10

Unit - III : 11, 20 , 23

Unit – IV : 24 , 25 , 26

Unit - V : 31 , 32 , 22

Reference Books:

1. Raoul Gabriee Urma, *Introducing java 8*, O Reilly Mrdia, 1st Edition, 2015.
2. James Gosling, Bill Joy, Guy Steele, Gilad Bracha, Alex Bukley, *The Java Language Specification Java SE*, 7th Edition, 2013.
3. Joshua Bloch, *Effective Java* , Pearson Addison – Wesley , 3rd Edition , 2018
4. E.Balagurusamy, *Progamming with Java A Primer*, Tata MC Graw Hill, 6th Edition, 2019.
5. Hari Mohan Pandey , *Java Programming* , Pearson , 1st Edition , 2012.

Annexure-25

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper : Data Communications and Networking
Semester : II **Contact Hours : 4**
Sub Code : 20MC23 **Credits : 4**

Objective:

To acquire knowledge about Transmission Media , LAN , ISDN , ATM , Transport Layer concept.

Unit – I

Introduction : Data Communications – Networks – Networks Types –Standards and Administration. **Network Models :** TCP/IP Protocol Suite – The OSI Model.

Unit – II

Bandwidth Utilization: Multiplexing and Spectrum Spreading: Multiplexing. **Transmission Media** : Guided Media - UnGuided Media : Wireless . **Switching** : Circuit-Switched Networks – Packet Switching .

Unit – III

Error Detection and Correction: Introduction - Block Coding - Cyclic Codes - Checksum. **Wired LANs: Ethernet:** Ethernet Protocol. **Other Wireless Networks :** Cellular Telephony - Satellite Networks.

Unit – IV

Network Layer: Introduction to Network Layer : Network-Layer Services – Network Layer Performance – IPV4 Addresses : – Address Space – Classful Addressing – Classless Addressing .**Unicast Routing :** Routing Algorithms , Unicast Routing Protocols **:-** Routing Information Protocol(RIP) . **Multicast Routing :** Multicasting Basics.

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Unit – V

Transport Layer : Introduction to Transport Layer : Introduction – Transport – Layer Protocols. **Transport–Layer Protocols** : User Datagram Protocol - , Transmission Control Protocol : – TCP Services , TCP Features – Segment – A TCP Connection – Flow Control – Error Control . **Standard Client-Server Protocols :** Domain Name System(DNS) **.**

Text Book :

Behrouz A. Forouzan , *Data Communications and Networking* , Mc-Graw Hill , 5th Edition , 2013.

Chapters:

Unit - I : 1.1 – 1.3 , 1.5 , 2.2 , 2.3

Unit - II : 6.1 , 7 .2 , 7.3 , 8.2 , 8.3

Unit - III : 10.1 – 10.4 , 13.1 , 16.2 , 16.3

Unit - IV : 18.1 , 18.3 ,18.4 - 18.4.1,18.4.2,18.4.3, 20.2 , 20.3 - 20.3.2, 21.2

Unit – V : 23.1 , 23.2 , 24.2 , 24.3-24.3.1 , 24.3.2 , 24.3.3 , 24.3.4 , 24.3.7 , 24.3.8 , 26.6

Reference Books:

1.Achyuts Godbole , Atul Kahate , *Data Communications And Networks* , Tata McGraw Hill , 2nd Edition , 2013.

2. Andrew S. Tanenbam , *Computer Network* , PHI , 5th Edition , 2013.

3. Kurose James F, Ross Keith W**.** *Computer Networking: A Top-Down Approach,* Pearson Education; 6th Edition , 2017

4. William Stallings, *Data and Computer Communications* , Pearson , 10th Edition,2017

5. Bhushan Trivedi , *Data communications and Networks* ,Oxford University Press , Edition 2016.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper : Data Mining and Data Warehousing
Semester : II **Contact Hours : 4**
Sub Code : 20MC24 **Credits : 4**

Objectives:

To acquire knowledge about Data Mining, Classification, Cluster analysis, Preprocessing , data mining trends , Data Warehousing in desired manner.

Unit - I

Introduction : Why Data Mining? - What is Data Mining? – What kinds of data can be mined? - What kinds of patterns can be mined? - Which technologies are used? –Which kinds of Applications are targeted? - Major issues in Data Mining . **Data Warehousing and Online Analytical Processing:** Data Warehouse: Basic Concepts -Data Warehouse Modeling: Data Cube and OLAP – Data Warehouse Design and Usage - Data Warehouse Implementation .

Unit - II

Data Preprocessing : **Data Preprocessing: An overview** - Data Cleaning - Data Integration - Data Reduction - Data Transformation and Data Discretization.

Unit - III

Classification: Basic Concepts: Basic Concepts - Decision Tree Induction – Bayes Classification Methods – Rule-Based Classification. **Classification: Advanced Methods**: Bayesian Belief Networks-Classification by Back propagation – Support Vector Machines – Lazy Learners- Other Classification Methods.

Unit - IV

Cluster Analysis: Basic Concepts and Methods: Cluster Analysis-Partitioning Methods –Hierarchical Methods – Density-Based Methods- Grid-Based Methods. **Advanced Cluster Analysis:** Probabilistic Model-Based Clustering - Clustering High-Dimensional Data- Clustering Graph and Network Data – Clustering with Constraints.

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Unit - V

Outlier Detection: Outliers and Outlier Analysis – Outlier Detection Methods. **Data Mining Trends and Research Frontiers**: Mining Complex Data Types- Other Methodologies of Data Mining-Data Mining Applications- Data Mining and Society- Data Mining Trends.

Text Book:

Jiawei Han and Micheline Kamber , Jian Pei , *Data Mining Concepts and Techniques* , Elsevier Publisher , 3rd Edition , 2011.

Chapters:

Unit - I : 1.1 to 1.7, 4.1 to 4.4

Unit - II : 3.1 to 3.5

Unit - III : 8.1 to 8.4, 9.1 to 9.3, 9.5,9.6

Unit - IV : 10.1 to 10.5, 11.1 to 11.4

Unit - V : 12.1, 12.2, 13.1 to 13.5

Reference Books:

1. Pang-Ning Tan , Michael Steinbach , Vipin Kumar , Anuj Karpatne , *Introduction to Data Mining* , Second Edition , 2019
2. Parteek Bhatia , *Data Mining and Data Warehousing: Principles and Practical Techniques* , Cambridge University Press , 1st Edition , 2019.
3. Arun K.Pujari, *Data Mining Techniques* , Universities Press, 4th Edition , 2016.
4. S.K. Mourya, Shalu Gupta, *Data Mining and Data warehousing* , Narosa Publishing House Private Ltd , 1st Edition , 2013.
5. Bharat Bhushan Agarwal, *Data Mining and Data Warehousing*, Laxmi Publications , 1st Edition , 2012.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2020-2021 Batch Onwards)
ELECTIVE - I

Title of the Paper : Software Engineering
Semester : II **Contact Hours : 4**
Sub Code : 20MCE2A **Credits : 4**

Objective:

To be aware of different life cycle Models, Analysis, Design, Implementation, Testing , SCM and Quality Assurance.

Unit – I

Software Engineering: Software Engineering – A Layered Technology- **A Process Models** -A Generic Process Model – Process Assessment and Improvement - Prescriptive Process Models - Specialized Process Models – The Unifies Process Model- Personal and Team Process Models – Process Technology- Product and Process –**Agile Development** – What is Agility? –Agility and the cost of change- What is an Agile Process? - Extreme programming (XP) – Other Agile Process Models **.**

Unit – II

Estimation: Observation on Estimation - Empirical Estimation Models**. Project Scheduling:** Basic Concepts – Project Scheduling**. Risk Management:** Reactive Vs. Proactive Risk Strategies - Software Risks – Risk Identification – Risk Projection – Risk Refinement. **Principles that Guide Practice** – Software engineering Knowledge - Core Principles – Principles That Guide Each Framework Activity.

Unit – III

Understanding Requirements: Requirements Engineering – Establishing the Ground work – Eliciting Requirements – Developing Use Cases – Building the Requirements Model. – Negotiating Requirements- Validating Requirements - **Design Concepts :** Design

within the Context Of Software Engineering - Design Concepts – The Design Model - **Architectural Design:** Software Architecture- Architectural Genres – Architectural Styles- Architectural Design – Assessing Alternative Architectural Design – Architectural Mapping Using Data Flow.

Unit – IV

Software Testing Strategies: A Strategic Approach To Software Testing – Strategic Issues - Test Strategies For Conventional Software - Test Strategies for Object-Oriented Software –Test Strategies for Web Apps - Validation Testing - System Testing - **Testing Conventional Applications:** Software Testing Fundamentals - Internal and External Views of Testing - White Box Testing - Basis Path Testing - Control Structure Testing - Black Box Testing – Model Based Testing.

Unit – V

Quality Concepts- What is Quality – Software Quality - **Software Quality Assurance –** Background Issues – Elements of Software Quality Assurance - SQA Tasks , Goals and Metrics - Formal Approach To SQA - Statistical Software Quality Assurance – Software Reliability – **Software Configuration Management -** Software Configuration Management- The SCM Repository - The SCM Process.

Text Book:

Roger S. Pressman., *Software Engineering : A Practitioner's Approach* , McGraw Hill (India) Edition , 7th Edition (Alternate Edition), 2014

Chapters:

Unit - I :1.3, 2.1 to 2.8, 3.1 to 3.5

Unit - II : 26.1, 26.7, 27.1, 27.2, 28.1 to 28.5, 4.1, 4.2, 4.3.

Unit - III : 5.1- 5.7, 8.1 ,8.3, 8.4, 9.1 to 9.6

Unit - IV : 17.1 to 17.7, 18.1 to 18.7

Unit - V : 14.1 to 14.2 , 16.1 to 16.6, 22.1 to 22.3

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Reference Books:

1. Ian Sommerville, *Software Engineering,* Pearson , 10th Edition, 2017.
2. Rajib Mall , *Fundamentals of Software Engineering* **,** PHI Learning Pvt. Ltd**. ,** 5th Edition , 2018.
3. Hitesh Mohapatra , Amiya Kumar Rath *, Fundamentals of Software Engineering* , BPB Publications , 1st Edition , 2020.
4. Ivar Jacobson , Harold "Bud" Lawson , Pan-Wei Ng, *The Essentials of Modern Software Engineering ,* ACM Books ,1st Edition, 2019.
5. Rajib Mall, Fundamentals of Software Engineering –PHI Learning private limited, 5th Edition,2014

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2020-2021 Batch Onwards)
ELECTIVE - I

Title of the Paper : Cloud Computing
Semester : II **Contact Hours : 4**
Sub Code : 20MCE2B **Credits : 4**

Objective:

The benefits of cloud computing are being recognized in businesses and institutions. The immediate benefits of cloud computing are obvious: cloud-based applications reduce infrastructure and IT costs, increase accessibility, enable collaboration, and allow organizations more flexibility in customizing their products both for their brand and for their audience.

Unit – I

Era of Cloud Computing : Getting to know the Cloud – Components of Cloud Computing – Cloud Types –Private , Public and Hybrid , Cloud Computing Service Delivery Models .**Cloud Computing Services –** Infrastructure as a Service(IaaS) – Platform as a Service(PaaS) – Leveraging PaaS for Productivity – Software as a Service(SaaS) – Database as a Service(DBaaS) – Specialized Cloud Services. **Cloud Types and Models** – Private Cloud –Components of a Private Cloud – Community Cloud – Public Cloud – Public Cloud – Hybrid Clouds. Cloud Deployment Techniques –Cloud Network Topologies – Automation for Cloud Deployments – Self-Service Features in a Cloud Deployment – Federated Cloud Deployments – Cloud Performance – Impact of Memory on Cloud Performance – Improving Cloud Database Performance .

Unit – II

Cloud Computing and Business Value : Key Drivers for Cloud Computing – Cloud Computing and Outsourcing – Types of Scalability – Distribution over the Internet. **Demsystifying Cloud Computing :** Myths and Truths . **Recent Trends in Cloud**

Annexure-25

Computing and Standards : Recent Trends in – Conflict of Interest for Public Cloud and IT Product Providers – Cloud Compliance – BYOD and Encryption Exposures – Cloud Standards – Cloud Ratings – Cloud Computing Trends that are Accelerating Adoption . **Data Security in the Cloud :** Challenges with Cloud Data - Challenges with Data Security – Data Confidentiality and Encryption – Data Availability – Data Integrity – Cloud Data Management Interface – Cloud Storage Gateways(CSGs) – Cloud Firewall – Virtual Firewall.

Unit – III

Application Architecture for Cloud : Cloud Application Requirements – Architecture for Traditional Versus Cloud Applications – Fundamental Requirements for Cloud Application Architecture – Use of Client-Server Architecture for Cloud Applications – Addressing Cloud Application Performance and Scalability –Service Oriented Architecture (SOA) for Cloud Applications – Parallelization within Cloud Applications. **Cloud Programming :** Programming Support for Google Apps Engine – Programming Support for Amazon EC2. **Migrating Applications to the Cloud :** Cloud Migration Techniques – Phase during Migration of an Application to the cloud – Cloud emulators and its use for Application Testing and Migration.

Unit – IV

SLA with Cloud Service Providers : The Concept of an SLA , SLA aspects and requirements – Service Availability – Cloud Outages – Credit Calculation for SLA Breaches – Sample SLA . **Introducing Virtualization :** Introducing Virtualization and its benefits – Implementation Levels of Virtualization – Virtualization at the OS Level –Virtualization Structure – Virtualization Mechanisms – Open Source Virtualization Technology – Xen Virtualization Architecture - Binary Translation with full Virtualization – Paravirtualization with Compiler Support – Virtualization of CPU , Memory and I/O Devices , Hardware Support for Virtualization in Intex x86 Processor – Virtualization in Multicore Processors .

Unit – V

Application Development for Cloud : Developing On-Premise Versus Cloud Applications – Modifying Traditional Application for Deployment in the Cloud – Stages during the Development Process of Cloud Application – Managing a Cloud Application –

Annexure-25

Using Agile Software Development for Cloud Applications – Static Code Analysis for Cloud Applications – Developing Synchronous and Asynchronous Cloud Applications. **Application Security in the Cloud :** Cloud Application Software Development Lifecycle(SDLC) – Cloud Service Reports by Providers – Application Security in an IaaS Environment - Application Security in an PaaS Environment - Application Security in an SaaS Environment .**Mobile Cloud Computing :** Definition of Mobile Cloud Computing – Architecture of Mobile Cloud Computing – Benefits of Mobile Cloud Computing - Mobile Cloud Computing Challenges .

Text Book:

Kailash Jayawal , Jagannath Kallakurchi , Donald J.Houde , Dr. Deven Shah, *Cloud Computing Black Book* , Dreamtech Press , 2014 Edition .

Chapters:

Unit - I **:** 1, 3 , 6 , 8
Unit - II **:** 4 , 5 , 9 , 10
Unit - III **:** 12 , 13 , 16
Unit - IV **:** 18 , 2
Unit - V **:** 24 , 25 , 27

Reference Books:

1. Thomas Erl Zaigham Mahmood Ricardo Puttini , *Cloud Computing: Concepts, Technology & Architecture*, PHI ,1st Edition , 2014
2 . Shailendra Singh , *Cloud Computing* , Oxford HED , 1st Edition , 2018
3. Arshdeep Dahga , Vijay Madisetti , *Cloud Computing A Hands – on Approach*, Universities Press , Reprint 2016
4., Mr. Ray Rafaels, *Cloud Computing* , Copyright , 2nd Edition , 2018.
5. A.Kannamal , *Fundamentals of Cloud Computing* , Cengage , 1st Edition ,2016

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A

(w.e.f. 2020-2021 Batch Onwards)

ELECTIVE - I

Title of the Paper : Enterprise Resource Planning

Semester : II **Contact Hours : 4**

Sub Code : 20MCE2C **Credits : 4**

Objective:

To obtain knowledge about Advanced Technology in ERP, ERP Security, Business Modeling and Architecture.

Unit - I

Introduction: Introduction to ERP – Basic ERP Concepts – Justifying ERP Investments - Benefits of ERP.

Unit - II

ERP and Related Technologies: ERP and Related Technologies - Advanced technology and ERP Security.

ERP Marketplace and Functional Modules: ERP Marketplace and Marketplace Dynamics – Business Modules of an ERP Package.

Unit - III

ERP Implementation: ERP Implementation Lifecycle - ERP Package Selection – ERP Transition Strategies .

Unit - IV

ERP Implementation: ERP Implementation Process –ERP Project Teams – Consultants, Vendors and Employees – Success and Failure factors of the ERP Implementation

Unit - V

ERP – Present and Future: **ERP and E-Business – ERP, The Internet, and WWW-ERP II – Future Directions and Trends in ERP**

Annexure-25

Text Book:

Alexis Leon, ERP Demystified , Tata Mc-Graw Hill , 3nd Edition , 2014.

Chapters:

Unit - I	: 3, 4, 5, 7
Unit - II	: 8, 9, 10, 11
Unit - III	: 13, 14, 15
Unit - IV	: 17, 18, 19, 20
Unit - V	: 23, 24, 25

Reference Books:

1. Joseph Brady A., Ellen Monk F., Bret Wagner, *Concepts in Enterprise Resource Planning* , Thompson Course Technology , 2nd Edition , 2011.
2. Alexis Leon, *Enterprise Resource Planning* , Mc-Graw Hill Education , 4th Edition , 2019
3. Mary Sumner , *Enterprise Resource Planning* , Pearson Education , 9th Edition , 2012
4. Alexis Leon , *Enterprise Resource Planning* , Mc-Graw Hill Education ,2nd Edition , 2014.
5. Bansal , *Enterprise Resource Planning* , Pearson India, 1st Edition , 2013.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A

(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper	**:**	**Open Source Technology Lab**	
Semester	**:**	**II**	**Contact Hours : 5**
Subject Code	**:**	**20MC21P**	**Credits : 2**

Program list:

1. Program using String.
2. Program using PHP Time zone
3. Program using Sorting Array.
4. Program using Global Array
5. Program using Function.
6. Program for reading data in Web pages.
7. Program using browser handling Power.
8. Program using Oops concept.
9. Program using File.
10. Program using Form Validation.
11. Program using PHP XML Parser
12. Program using PHP Filter
13. Program using MySQL Database Creation.
14. Program using MySQL Database table
15. Program using Session , Cookies and FTP.
16. Program using Web application Security.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2020-2021 Batch Onwards)

Title of the Paper : Java Programming Lab
Semester : II **Contact Hours : 5**
Sub Code : 20MC22P **Credits : 3**

Program List :

I Basic Programs

1)Write java program to print Biggest of 3 Numbers using Logical Operators

2) Write a java program to print first 10 numbers in Fibonacci series

3) Write a java program to print Factorial of a given number

4) Write a java program to print the names in sorted order using arrays

5) Write a java program to print multiplication table using arrays

II Method Overloading

1)Write a java program to demonstrate method overloading

III Constructor overloading :

1) Write a java program to illustrate the concept of constructors and its overloading.

2) Write a java program for Rectangle class using constructor overloading with different no. of parameter list.

IV Inheritance

1) Write a java program for Rectangle class using Simple Inheritance

2) Write a Java program to demonstrate multilevel inheritance.

V Method Overriding

1)Write a java program for Bank class using Method Overriding.

2) Write a java program to demonstrate Method overriding (use super keyword)

Annexure-25

VI Packages:

1) Write a Java program to demonstrate use of user defined packages.

2) Write a java package for book class and then import and display the result.

3) Write a java program to find the cube of a number for various data types using package and then import and display the results.

VII Interfaces:

1) Write a Java program to illustrate the multiple inheritance by using Interfaces.

VIII Exception handling:

1)Write a java program to demonstrate simple example for exception handling

2)Write a java program to demonstrate exception handling with multiple catch blocks

3) Write a java program using Number Format exception

IX File I/O and Streams

1)Write a java program to Demonstration of File Output Stream and Print Stream classes

2) Write a java program to Write bytes to a file

3) Write a java program to copy bytes from one file to another.

X Applets

1) Write a java program for Sum of Two Numbers using Applet

2) Write a java program for Applet using drawstring(), drawRect() and drawOval()

3) Write a Java program to demonstrate banner applet.

XI AWT

1)Write a java program that prints a message by clicking on the button using AWT

2) Write a java program to demonstrate Grid Layout manager using AWT

3) GUI with controls menus and event handling using SWING