COIMBATORE INSTITUTE OF TECHNOLOGY

(Government Aided Autonomous Institution Affiliated to Anna University, Chennai)

COIMBATORE - 641 014, TAMILNADU, INDIA

DIAMOND JUBILEE

(1956 - 2016)

DEPARTMENT OF COMPUTER APPLICATIONS

MASTER OF COMPUTER APPLICATIONS

Curriculum and Syllabi

Under Choice Based Credit System

(For the students admitted during 2023 - 2024 and onwards)

INDEX

COIMBATORE INSTITUTE OF TECHNOLOGY

(Government Aided Autonomous Institution Affiliated to Anna University, Chennai)

VISION AND MISSION OF THE INSTITUTE

VISION

The Institute strives to inculcate a sound knowledge in Engineering along with realized social responsibilities to enable its students to combat the current and impending challenges faced by our country and to extend their expertise to the global arena.

MISSION

The Mission of CIT is to impart high quality education and training to its students to make them World-Class Engineers with a foresight to the changes and problems, and pioneers to offer innovative solutions to benefit the nation and the world at large.

COIMBATORE INSTITUTE OF TECHNOLOGY

(Government Aided Autonomous Institution Affiliated to Anna University, Chennai)

DEPARTMENT OF COMPUTER APPLICATIONS

VISION AND MISSION

VISION

The Department of Computer Applications strives to groom students with diverse backgrounds into competitive software professionals and pioneering leaders in offering innovative solutions to dynamic global challenges in tune with the needs of the society.

MISSION

The Mission of Department of Computer Applications is to :

M1 Provide an environment for students to gain expertise in theoretical foundations of computer applications with emphasis on strong practical training that will enable them to develop real world applications catering to the global needs.

M2 Offer students a quality learning process in a research oriented environment with industrial collaboration that motivates them to innovate and explore.

M3 Develop intellectual curiosity and a commitment to lifelong learning in students, with societal and environmental concerns.

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DEPARTMENT OF COMPUTER APPLICATIONS

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs for MCA programme are designed based on the Department Mission.

MCA Graduates will be able to :

PEO 1 : Develop software solutions to problems across a broad range of application domains through analysis and design.

PEO 2 : Contribute to research of their chosen field and function and communicate effectively, to perform both individually and in a multi-disciplinary team.

PEO 3 : Continue the process of life-long learning through professional activities; adapt themselves with ease to new technologies, while exhibiting high ethical and professional standards.

COIMBATORE INSTITUTE OF TECHNOLOGY

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DEPARTMENT OF COMPUTER APPLICATIONS

PROGRAMME OUTCOMES (POs)

The following are Programme Outcomes for the MCA Programme :

PO1 : Graduates will be able to apply knowledge of computing fundamentals, computing specialization and domain knowledge for the abstraction and conceptualization of computing models from defined problems and requirements.

PO2 : Graduates will have the ability to understand and analyze a given real-world problem and propose feasible computing solutions.

PO3 : Graduates will be able to analyze customer requirements, create high level design, implement and document robust and reliable software systems.

PO4 : Graduates will be able to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies.

PO5 : Graduates will be able to use the techniques, skills and modern hardware and software tools necessary for innovative software solutions.

PO6 : Graduates will possess leadership and managerial skills with best professional ethical practices and social concern.

PO7 : Graduates will recognize the need for self-motivation to engage in lifelong learning.

PO8 : Graduates will be able to master fundamental project management skills, concepts and techniques, set attainable objectives and ensure positive results, meeting scope, time and budget constraints.

PO9 : Graduates will be able to communicate technical information effectively, both orally and in writing

PO10 : Graduates will be able to recognize the social, professional, cultural, and ethical issues involved in the use of computer technology and give them due consideration in developing software systems.

PO11 : Graduates will be able to work collaboratively as a member or leader in multidisciplinary teams.

PO12 : Graduates will be able to assess the need for innovation and initiate the process through entrepreneurship or otherwise.

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DEPARTMENT OF COMPUTER APPLICATIONS

MCA 2 YEARS PROGRAMME 2023

Curriculum from the Academic Year 2023 and onwards

Under Choice Based Credit System

Name of the degree : MCA

Specialization: Computer Applications

Semester I

Course Code	Course Name	L	T	P	C	CY
23MCA111	Mathematical Foundations of Computer Applications	3	1	0	4	FC
23MCA131	Object Oriented Programming with Java	2	0	2	3	PC
23MCA112	Data Structures and Algorithms	3	0	0	3	FC
23MCA113	Database Management Systems	3	0	0	3	FC
23MCA114	Operating System	3	0	0	3	FC
23MCA121	Data Structures Laboratory	0	0	3	1.5	FC
23MCA122	Database Management Systems Laboratory	0	0	3	1.5	FC
23MCA123	Python Programming Laboratory	0	0	4	2	PC
23MCA124	Communication Skills	0	0	2	1	EEC
	Total Credits	**14**	**1**	**14**	**22**	

Semester II

Course Code	Course Name	L	T	P	C	CY
23MCA211	Advanced Machine Learning Techniques	3	0	0	3	PC
23MCA212	Design and Analysis of Algorithms	2	0	2	3	FC
23MCA231	Agile Methods for Software Development	3	0	0	3	FC
	Elective I	3	0	0	3	PE
	Elective II	3	0	0	3	PE
23MCA221	Machine Learning Laboratory	0	0	4	2	PC
23MCA222	Full Stack Web Development Laboratory	0	0	3	1.5	PC
	Elective Lab I	0	0	3	1.5	PE
23MCA241	Mini Project	0	0	2	1	EEC
23MCA223	Soft skills – I	0	0	2	1	EEC
	Total Credits	**14**	**0**	**16**	**22**	

Semester III

Course Code	Course Name	L	T	P	C	CY
23MCA311	Network and Cyber Security	3	0	0	3	PC
23MCA331	Virtualization and Cloud Computing	2	0	2	3	PC
23MCA312	Big Data Analytics	3	0	0	3	PC
	Elective III	3	0	0	3	PE
	Elective IV (Management Elective)	3	0	0	3	PE
23MCA321	Network and Cyber Security Lab	0	0	3	1.5	PC
23MCA322	Big Data Analytics Lab	0	0	4	2	PC
	Elective Lab II	0	0	3	1.5	PE
23MCA323	Soft Skills – II	0	0	2	1	EEC
	Total Credits	**14**	**0**	**16**	**21**	

Semester IV

Course Code	Course Name	L	T	P	C	CY
23MCA441	Project work and viva voce	-	-	30	15	EEC
	Total Credits	**3**	**0**	**30**	**15**	

Total Credits : 80

Professional Electives - IT Electives						
Course Code	**Course Name**	**L**	**T**	**P**	**C**	**CY**
23MCAE101	Graphics and Multimedia	3	0	0	3	PE
23MCAE102	Advanced Database Management Systems	3	0	0	3	PE
23MCAE103	Internet of Things	3	0	0	3	PE
23MCAE104	Software Metrics and Measurement	3	0	0	3	PE
23MCAE105	Micro Service Architecture and RESTful Services	3	0	0	3	PE
23MCAE106	Blockchain Technologies	3	0	0	3	PE
23MCAE107	Single Page Web Applications	3	0	0	3	PE
23MCAE108	Digital Marketing	3	0	0	3	PE
23MCAE109	Design Thinking	3	0	0	3	PE
Professional Electives - Data Science Electives						
Course Code	**Course Name**	**L**	**T**	**P**	**C**	**CY**
23MCAE110	Artificial Intelligence	3	0	0	3	PE
23MCAE111	Information Retrieval	3	0	0	3	PE
23MCAE112	Deep Learning	3	0	0	3	PE
23MCAE113	Data Mining and Warehousing	3	0	0	3	PE
23MCAE114	Computational Intelligence	3	0	0	3	PE

Professional Electives - Management Electives						
Course Code	**Course Name**	**L**	**T**	**P**	**C**	**CY**
23MCAE115	Organizational Behaviour	3	0	0	3	PE
23MCAE116	Principles of Management	3	0	0	3	PE
23MCAE117	Accounting and Financial Management	3	0	0	3	PE
23MCAE118	E-Commerce	3	0	0	3	PE
23MCAE119	Entrepreneurship Development	3	0	0	3	PE
Professional Electives Laboratories						
Course Code	**Course Name**	**L**	**T**	**P**	**C**	**CY**
23MCAE201	Deep Learning Laboratory	0	0	3	1.5	PE
23MCAE202	Graphics and Multimedia Laboratory	0	0	3	1.5	PE
23MCAE203	Internet of Things Laboratory	0	0	3	1.5	PE
23MCAE204	User Interface Laboratory	0	0	3	1.5	PE
23MCAE205	Mobile Application Development Laboratory	0	0	3	1.5	PE
23MCAE206	Digital Marketing Laboratory	0	0	3	1.5	PE
23MCAE207	Data Mining Laboratory	0	0	3	1.5	PE
23MCAE208	Computational Intelligence Laboratory	0	0	3	1.5	PE
23MCAE209	Artificial Intelligence Laboratory	0	0	3	1.5	PE

	Bridge Courses**					
Semester I						
Course Code	**Course Name**	**L**	**T**	**P**	**C**	**CY**
23MCAB121	Problem Solving Techniques	1	0	0	0	FC
23MCAB122	Programming in C	1	0	0	0	FC
23MCAB123	Computer Hardware and Organization	1	0	0	0	FC
Semester II						
Course Code	**Course Name**	**L**	**T**	**P**	**C**	**CY**
23MCAB221	Fundamentals of Internet	1	0	0	0	FC
23MCAB222	Software Engineering	1	0	0	0	FC
23MCAB223	Programming in C++	1	0	0	0	FC

** Applicable for the candidates from non-computer science Under Graduation

23MCA111 MATHEMATICAL FOUNDATIONS OF COMPUTER APPLICATIONS

L	T	P	C
3	1	0	4

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT: THEORY

COURSE OUTCOMES

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

CO1: Test the consistency and solve the system of linear equations.
CO2: Understand the properties and applications of probability distributions.
CO3: Use statistical techniques in testing hypothesis on data analysis.
CO4: Acquire sound knowledge of analysis in the time series and the appropriate statistical technique of design of experiments in data analysis.

LINEAR ALGEBRA

System of linear equations – Row Reduction and Echelon Forms- Vector equations- Solution Sets of Linear Systems - Linear Independence - Linear transformation - Matrix of linear transformations.

15

PROBABILITY

Probability Axioms - Conditional Probability - Laws of total probability - Baye's theorem.One Dimensional Random variables - Discrete case and Continuous case - Distributions: Binomial, Poisson and Normal Distributions.

15

SAMPLING THEORY

Large samples –Testing of hypothesis about population mean-difference between two means-two Standard deviations. Small samples – t-distribution -Testing of hypothesis about the population mean- difference between two sample means-F-distribution - Testing of hypothesis for equality of two Variances –Chi-Square Distribution –Test for goodness of fit –Independence of Attributes.

15

TIME SERIES AND ANALYSIS OF VARIANCE

Component of time series - measurement of trend - moving average method - least square method for linear and exponential curves. Basic principles of experimental design - analysis of variance for one way classification - completely randomized design - Latin square design.

15

TOTAL : 45

REFERENCES

1. David C. Lay, "Linear Algebra and its Applications", Edition, Pearson Education, 2021.

2. Jay L Devore, “Probability and Statistics for Engineering and Sciences”, Cengage Learning, 2015.
3. Gilbert Strang, “Introduction to Linear Algebra”, Wellesley Cambridge Press and SIAM, 6th Edition, 2022.
4. Devore, J.L, Probability and Statistics for Engineering and Sciences, Cengage Learning, Eighth Edition, New Delhi, 2014.
5. Ronald E. Walpole, Raymond H. Meyers, Sharon L. Meyers, “Probability and Statistics for Engineers and Scientists”, Pearson Education, 2012.
6. I. Miller and M. Miller, Mathematical Statistics, Pearson Education Inc., Asia Seventh Edition, New Delhi, 2011.
7. Richard Johnson, Miller and Freund’s Probability and Statistics for Engineer, Prentice Hall of India Private Ltd., Eighth Edition, New Delhi, 2011.

23MCA131 – OBJECT ORIENTED PROGRAMMING IN JAVA

L	T	P	C
2	0	2	3

PRE-REQUISITES:

Consent of the Instructor

ASSESSMENT: THEORY AND PRACTICALS

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

CO1: Understand the need and fundamental concepts of object oriented programming and will be able to solve computational problems using basic constructs like if-else, control structures, array, and strings in the java environment.

CO2: Know how to model the real world scenario using the class diagram and be able to exhibit initialization, communication and relationship between objects using object oriented features like class, constructors, inheritance, and polymorphism.

CO3: Write concurrent programs, debug the programs tracing for possible errors and organize the application programs into packages and prepare a deployable application for the given software solution.

CO4: Design and develop interactive two tier or three tier web applications using web programming and database connectivity.

THEORY

BASIC LANGUAGE ELEMENTS

Features of Java Language - JVM and Bytecode - Data Types - Variables - Keywords - Constants - Comments - Operators and Expressions - Control Statements.

OBJECT ORIENTED PROGRAMMING

Classes - Object & Object reference - Constructors and Initialization - Access Control - Accessor and Mutator Methods - Overloading Methods and Constructors - Static Members - Use of Modifiers with Classes and Methods.

(3+4)

ARRAYS AND STRINGS

Defining an Array - Initializing and Accessing Array - Multi–dimensional Array- String Handling - Mutable & Immutable Strings - Creating Strings using StringBuffer.

EXTENDING CLASSES AND INHERITANCE

Use and Benefits of Inheritance in OOP - Types of Inheritance in Java - Inheriting Data members and Methods - Role of Constructors in Inheritance - Overriding Superclass Methods - Use of “super” keyword - Dynamic Method Dispatch - Using Abstract Classes - Using Final with

Inheritance - The Object Class - Interfaces - Implementing Interfaces - Nested Interfaces - Variables in Interfaces. **(3+5)**

THREADS

Java Thread Model - Need for Concurrent Programming - Thread Life Cycle - Thread Priorities - Creating a Thread - Extending a Thread - Creating Multiple Threads - Using Thread Methods - Thread Exceptions - Inter-thread communication - Synchronizing Threads.

EXCEPTION HANDLING AND PACKAGES

Exception Hierarchy - Types of Exception - Control Flow In Exceptions - Use of try, catch, finally, throw, throws in Exception Handling -In-built and User Defined Exceptions - Checked and Un-Checked Exceptions. Organizing Classes and Interfaces in Packages - Access Protection - Defining Package - Importing Packages. **(5+3)**

WEBCLIENT UI, JDBC AND SERVERSIDE SCRIPTING

Introduction to HTML and CSS - Web Development using Bootstrap CSS - Client side scripting using Javascript. Introduction to ODBC, JDBC - JDBC Drivers & Architecture - CRUD operations Using JDBC - Connecting to conventional Databases - Server side scripting using JSP **(7)**

TOTAL : 30

PRACTICALS

1. Basic problem solving programs using control structures.
2. Object Oriented programming structures - Initialization, instantiation, static scope
3. Object Oriented programming features - Inheritance, Exception and Packaging
4. Advanced Java Features - Interfaces, Multi threading
5. Java Web Programming - HTML, CSS and event handling using javascript
6. Generating Response pages using JSP
7. Connecting to Databases **(30)**

TOTAL : 60

REFERENCE BOOKS

1. Herbert Schildt, “Java The Complete Reference”, 9th Edition, Tata MCGraw Hill Publishing Company Limited, 2019.
2. E. Balagurusamy, “Programming with Java:A Primer”, 5th Edition, Tata MCGrawHill Publishing Company Limited, 2017.
3. Cay S. Horstmann, Gray Cornell, “Core Java Volume I - Fundamentals”, 9th Edition, Pearson Education, 2013.
4. Herbert Schildt, “Java: A Beginners Guide”, 6th Edition, Tata MCGraw Hill Publishing Company Limited, 2014.

23MCA112 - DATA STRUCTURES AND ALGORITHMS

L	T	P	C
3	0	0	3

PRE-REQUISITES:

Consent of the Instructor

ASSESSMENT: THEORY

COURSE OUTCOME:

Upon completion of the course, students will be able to:

CO1 : Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.

CO2 : Understand basic data structures such as arrays, linked lists, stacks and queues.

CO3 : Solve problem involving graphs, trees and heaps

CO4: Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

BASIC CONCEPTS

System Life Cycle - Algorithm Specification - Data Abstraction - Primitive Data Structures - Iterative and Recursive algorithms - Performance Analysis - best case - worst case - average case complexities - Notations.

ARRAYS, STACKS AND QUEUES

Array as an Abstract Data Type (ADT) - Polynomial ADT - Sparse Matrix ADT - Representation of Multidimensional Arrays - String ADT. Stack ADT - Queue ADT - Mazing Problem - Evaluation of Expressions - Multiple Stacks and Queues.

(3+8)

LINKED LISTS

Pointers - Singly Linked Lists - Dynamically Linked Stacks and Queues - Polynomials - Additional List Operations - Equivalence Relations - Sparse Matrices - Doubly Linked Lists.

(11)

TREES

Introduction - Binary Trees - Binary Tree Traversals - Additional Binary Tree Operations - Threaded Binary Trees - Heaps - Binary Search Trees.

GRAPHS

Introduction - Elementary Graph Operations - Graph Traversal - Minimum Cost Spanning Trees Shortest Paths.

(8+4)

SEARCHING AND SORTING

Searching - Linear, binary, Ternary, jump, interpolation and List Verification . Sorting Techniques Selection, Insertion, Merge, Quick and Radix Sort. **(11)**

TOTAL : 45

REFERENCE BOOKS

1. Narasimha Karumanchi, “Data Structures and Algorithms Made Easy”, Copyright© 2017 CareerMonk Publications.
2. Ellis Horowitz, Sartaj Sahni, Anderson Freed, “Fundamentals of Data Structures in C”, 2nd Edition, Universities Press, 2008.
3. Yashavant P. Kanetkar, “Data Structures through C”, BPB Publications, 2nd Edition, 2003.
4. Seymour Lipschutz, “Data Structures with C”, Schaum's Outline Series,2nd Edition, McGraw Hill Publications, 2014.

23MCA113 DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT: THEORY

COURSE OUTCOMES

CO1: To Understand the basic concepts and the applications of database systems.

CO2: To Master the basics of SQL and construct queries using SQL.

CO3: To understand the relational database design principles.

CO4: To become familiar with the basic issues of transaction processing, concurrency control, database storage structures and access techniques.

BASIC CONCEPTS

Database & Database Users - Characteristics of the Database Approach - Advantages of using DBMS. Data Models, Schemas & Instances - DBMS Architecture & Data Independence - System Architecture for DBMS and Data Dictionary, Database Users Data Base languages & Interfaces. Data Modeling using the Entity-Relationship Model - Entity types, Entity Sets, Attributes and Keys, Relationship, Relationship Types, Weak Entity Types, Structural Constraints, Enhanced ER Model- Specialization Generalization, Constraints on Specialization Generalization. **Relational Data Model:** Relational Data Model Concepts and Constraints - Relational Algebra - select, project, set theoretic, join operations - Overview of Relational Calculus. **(12)**

RELATIONAL, LANGUAGES & SYSTEMS

SQL - A Relational Database Language. Data Definition commands, View and Queries, transaction commands,Specifying Constraints & Indexes in SQL. **Relational Database Design:** Function Dependencies & Normalization for Relational Databases - Informal design guidelines for relation schemas, Functional Dependencies - Normal forms based on primary keys (INF, 2NF, 3NF& BCNF) - Lossless join & Dependency preserving decomposition - Multivalued dependencies, join dependencies (4NF & 5NF), Denormalization.

(12)

TRANSACTIONS, CONCURRENCY CONTROL, RECOVERY TECHNIQUES

Basic concept - ACID properties- transaction state- implementation of atomicity and durability - concurrent executions - basic idea of serializability - view and conflict serializability Recovery Techniques Failure Classification , Storage Structure, Recovery and Atomicity Log Based Recovery, Shadow Paging ,stable storage implementation, data access - recovery and atomicity - log based recovery - deferred database modification - immediate database modification, checkpoints.

(12)

NOSQL DATABASE

Why NoSQL: The Value of Relational Databases, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL.**Aggregate Data Models:** Aggregates, Column-Family Stores, Summarizing AggregateOriented Databases **More Details on Data Models:** Relationships, Graph Databases, Schemaless Databases, Materialized Views, Modeling for Data Access.

(9)

TOTAL : 45 Hours

REFERENCES

1. Ramez Elmsari and Shamkant B Navathe, "Fundamentals of Database System ", 7th edition, Pearson Education 2017.
2. Avi Silberschatz, Henry F.Korth, S. Sudarshan "Database System Concepts", 7th edition, McGraw Hill Publications 2019.
3. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Pearson Addision Wesley, 2013

23MCA114 - OPERATING SYSTEM

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Demonstrate the structure of operating system and estimate system performance through various scheduling algorithms

CO2 : Apply Process Management, Concurrent process and Inter Process Communication techniques.

CO3 : Recognize memory allocation and de-allocation for both static and dynamic storage

CO4 : Design and develop a simple File System using Disk and File System Management

INTRODUCTION

Abstract view of an Operating system - Extended view of Resource Manager - System Structure: IO Structure – Memory – CPU - Kernels and Micro kernels - Dual-mode operation - Operating System Services - System Calls - Structure of Operating system- Various components of Operating system.

PROCESS MANAGEMENT

Process Concepts - Process Creation - Process Termination - Process States - Process Description - Process control. **PROCESSOR MANAGEMENT:** Basic Concepts - Scheduling criteria - Preemptive versus non-preemptive scheduling - Scheduling algorithms: FIFO - Shortest job first, Priority, Round robin, Multilevel queue - Multilevel feedback queue - Multiprocessor scheduling. **(13)**

MULTITHREADING

Relationship between process and threads - Thread State - Thread Scheduling- Thread Synchronization - Multithreading model - Concurrent Process - Process Synchronization: critical section problem - Mutual Exclusion - Dekker's algorithm - Synchronization hardware - Semaphore - Classical problems of synchronization - Critical regions - Monitors - Atomic transaction - Race condition. Dead lock Characterization - Handling dead locks - Prevention - Avoidance - Detection and Recovery - Combined approach. **(12)**

MEMORY MANAGEMENT

Basic Concepts - Logical versus Physical address - Swapping - Fixed partition and Dynamic partition - Simple paging - Multi level paging - Inverted paging - Simple segmentation - Combined paging and segmentation - Virtual memory - Demand paging - Thrashing- Working set model - Demand segmentation. **(10)**

I/O AND FILE MANAGEMENT

I/O: hardware - Application I/O interface - Logical structure of I/O functions - I/O Buffering - Disk I/O - Disk scheduling. File management: File concepts - Access methods - Directory structure - File system structure - Allocation methods - Free space management.

(10)

TOTAL : 45

REFERENCES

1. Abraham Silberschatz. A, Peter Baer Galvin, Greg Gagne, "Operating System Concepts", John Wiley, 10th Edition, 2018.
2. William Stallings, "Operating Systems: Internals and Design Principles", Pearson Education, 9th edition, 2018.
3. H.M.Dietel, "An Introduction to Operating Systems", Addison Wesley, 2nd Edition, 2007.
4. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India Pvt. Ltd, 2008.

23MCA121 - DATA STRUCTURES LABORATORY

L	T	P	C
0	0	3	1.5

PRE-REQUISITES

20MCA12

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon Completion of the course, the students will be able to:

CO1: Write simple and recursive algorithms to solve problems involving stored data and analyze the space and time complexity

CO2: Understand the concept of data structures and implement suitable ADT for the given problem using varied stack, Queue and Linked list representations

CO3: Define a suitable tree data structure when the data elements of the given problem are related with each other and provide an algorithm for faster access to data elements.

CO4: Able to sort the huge set of data elements and provide solutions to complex search problems using graph representations and recursive algorithms

CONCEPTS TO BE COVERED:

1. Applications of 2D, 3D arrays, problem solving algorithms
2. Compute time and space complexity for simple programs
3. Basic operations of stack- Array, linked list implementation
4. Building applications using stack
5. Basic operations of queue- Array, linked list implementation
6. Implementing priority queue, circular queue
7. Implement linear linked list, doubly linked list
8. Recursion - Towers of Hanoi, Fibonacci series
9. Building Binary Search Tree, operations on BST operations on AVL trees
10. Graph operations
11. Implement Sorting & Searching technique

23MCA122 - DATABASE MANAGEMENT SYSTEMS LABORATORY

L	T	P	C
0	0	3	1.5

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOME

Upon completion of the course, students will be able to:

CO1 : Design the conceptual data model as Entity Relationship diagram and create the database using DDL statements for a given application

CO2 : Formulate simple DML SQL queries to retrieve the required data for real world applications

CO3 : Generate DML queries using Subqueries, Joins, Group By, Order By and Aggregate functions to filter and aggregate the data of the real world applications

CO4 : Construct reusable PL/SQL blocks with Functions, Procedures, Packages, Triggers, Exception Handling and Cursors as required by OLTP applications and can develop Develop a database project by constructing ER model.

CONCEPTS TO BE COVERED

PART I : SQL

1.Implementation of DDL and DML Statements

2.DCL and TCL Commands

3.Single Line and Group Line functions

4.Queries using multiple tables, Join

5.Set Operations in SQL

6.Aggregating data using Group functions, Use of Group by/Having clause

7.Sub queries in SQL

8.Constraints

9.Views, Sequence, Index, Synonym

PART II : PL/SQL

1.Simple programs

2.Exception Handling,

3.Trigger and Cursor

4.Functions, Procedure and Packages

PART III – Client/Server Application

1.Embedded SQL within a programming language .

23MCA123 - PYTHON PROGRAMMING LABORATORY

L	T	P	C
0	0	4	2

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Write, test, and debug Python programs using conditional and looping statements.

CO2 : Represent compound data using strings, lists, tuples, and dictionaries.

CO3 : Develop modular programs using functions and perform numerical operations on large datasets.

CO4 : Apply suitable library function to analyze and classify the data.

CONCEPTS TO BE COVERED

1. Program development using variables and operators.
2. Program development using conditional, control and repetition statements.
3. Data manipulation using lists, tuples and dictionaries.
4. Handling text data using string handling operations and functions.
5. Modular programming using functions and lambdas.
6. The use of local, global and built-in names within functions.
7. File operations - read, write, copy, word count.
8. Performing numerical operations using NumPy package.
9. Analyzing large datasets using Pandas package.

23MCA124 COMMUNICATION SKILLS

L	P	T	C
0	0	2	1

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

CO1: Acquire soft skills for workplace communication

CO2: Prepare an effective CV, demonstrate appropriate Group behaviour and Interview Skills

CO3: Develop Emotional Intelligence and Crisis Management

CO4: Illustrate Leadership, problem solving skills and workplace etiquette

SOFT SKILLS

Soft Skills, Soft skills versus hard skills, Importance of Soft skills, Acquiring LSRW skills, The power of positive thinking, positive self-talk, Self-esteem and positive attitude, Attitude in the workplace, Building a positive attitude, Testing One's attitude, Adaptability

(7)

EMPLOYABILITY SKILLS

Transition from education to employment, Preparing for employment, Preparing a road map for employment, Getting ready for the selection process, Preparing a CV, Some useful pointers on drafting a CV, Group Discussion and Interview Skills

(8)

EMOTIONAL INTELLIGENCE

Emotional Intelligence, Enhancing one's emotional self-awareness, Emotional Intelligence and Change Management, Unfreezing the old, re-freezing the new, Change and stress, Emotional Intelligence and Crisis Management. (7)

WORKPLACE ETIQUETTE

Importance of Grooming , global and local Culture sensitivity, , Etiquette in interaction and Netiquette, Significance of team spirit and Being an effective team player, Team formation and development. (8)

Total : 30

REFERENCE BOOKS:

1. Maithry Shinde et.al. “Life Skills & Personality Development” CUP. 2022
2. Agna Fernandez, “Generic Skills for Employability” CUP, 2022
3. Sabina Pillai & Agna Fernandez, “Soft Skills & Employability Skills”, CUP, 2018

23MCA211 – ADVANCED MACHINE LEARNING TECHNIQUES

L	T	P	C
3	0	0	3

PRE-REQUISITES

23MCA111

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Recognize fundamental issues and challenges of machine learning : data, model selection, model complexity, supervised and unsupervised learning.

CO2 : Understand and apply Decision trees and Artificial Neural Networks.

CO3: Analyze and use Bayesian learning, Instance based learning and reinforcement learning in real time problems.

CO4: Use ensemble techniques and recognize the application of markov chain approaches for random sampling and model probabilities for building machine learning models

INTRODUCTION

Designing a Learning System - Perspectives and Issues in Machine Learning

CONCEPT LEARNING

Concept Learning Task- Concept Learning as Search- Find-S- Version Space- Inductive bias.

DECISION TREES

Decision tree representation, Decision tree Learning Algorithm- Hypothesis Basis- Inductive bias-Issues in Decision Tree learning.

(11)

ARTIFICIAL NEURAL NETWORKS

Introduction- Neural Network Representations- Perceptrons - Multilayer Networks Back Propagation Algorithm- Remarks on the Back propagation Algorithm- Face Recognition Example- Advanced Topics in Artificial Neural Networks.

BAYESIAN LEARNING

Bayes Theorem - Bayes theorem and Concept Learning - Maximum Likelihood and Least Square Error Hypothesis - Maximum Likelihood Hypothesis for Predicting Probabilities - Minimum Description Length Principle - Bayes Optimal Classifier - Gibs Algorithm - Naive Bayes Classifier - Bayesian Belief Networks - The EM Algorithm. (12)

INSTANCE BASED LEARNING

k - Nearest Neighbour Learning, Locally weighted Regression- Radial Basis Functions- Case based Reasoning.

REINFORCEMENT LEARNING

The learning task - Non deterministic Rewards and Actions - Temporal Difference Learning - Generalizing from Examples - Relationship to Dynamic Programming.

(10)

ENSEMBLE LEARNING

Introduction to multiple models - Bagging: Bagged Decision Tree - Random Subspaces -Random Forest. Boosting: AdaBoost - Gradient Boosting Machines - Stochastic Gradient Boosting - XGBoost. Stacking: Voting.

MARKOV CHAIN MONTE CARLO METHODS

Sampling - Markov Chains - The metropolis - Hastings Algorithm - Gibbs Sampling.

(12)

TOTAL : 45

REFERENCES

1. Tom M Mitchell, "Machine Learning", 1st edition, McGraw Hill, 2018.
2. Stephen Marsland, “Machine Learning- An Algorithmic Perspective”, 2nd Edition, CRC Press, 2015.
3. Ethem Alpaydin, "Introduction to Machine Learning", 4th Edition, MIT Press, 2020.

23MCA231 – DESIGN AND ANALYSIS OF ALGORITHM

L	T	P	C
2	0	2	3

PRE-REQUISITES

Consent of the Instructor

COURSE OBJECTIVES

CO1 : To understand and apply the algorithm analysis techniques.

CO2 : To critically analyze the efficiency of alternative algorithmic solutions for the same problem

CO3 : To understand and implement different algorithm design techniques.

CO4 : To understand the limitations of Algorithmic power

INTRODUCTION: Fundamentals of algorithmic Problem solving – Important problem types- Fundamental Data Structures

FUNDAMENTALS OF THE ANALYSIS OF ALGORITHM EFFICIENCY: Analysis framework -- Asymptotic notations and basic complexity classes.

CASE STUDIES - Mathematical Analysis of Recursive, Nonrecursive Algorithms, Computing the nth Fibonacci number-Computing the nth Fibonacci Number.

(8)

DIVIDE-AND-CONQUER: Mergesort - Quicksort - Binary Tree Traversals and Related Properties - Multiplication of large integers and Strassen's matrix multiplication - closest pairs.

DYNAMIC PROGRAMMING: Knapsack problem and memory functions - Optimal Binary Search Trees - Warshall's and Floyd's algorithm.

(8)

GREEDY TECHNIQUE: Prim’s Algorithm - Kruskal’s Algorithm - Dijkstra’s Algorithm - Huffman Tree and coding

BACKTRACKING: n-Queens Problem - Hamiltonian Circuit Problem - Subset-Sum Problem.

(7)

BRANCH-AND-BOUND: Assignment Problem - Knapsack Problem - Traveling Salesman Problem **LIMITATIONS OF ALGORITHM POWER:** Lower-Bound Arguments - Decision Trees – P, NP and NP-complete problems. (7)

THEORY: 30

SUGGESTIVE EXERCISES

1. Implementation of iterative and recursive algorithms for the given problem
2. Implementation of divide-and-conquer sorting algorithms
3. Implementation of closest-pairs algorithm
4. Implementation of Huffman coding
5. Implementation of Dijkstra's and Prim's algorithms
6. Implementation of disjoint sets and Kruskal's algorithm
7. Implementation of dynamic programming algorithm for knapsack problem
8. Implementation of backtracking to solve n-Queens and Hamilton circuits problems
9. Implementation of iterative improvement strategy for stable marriage and maxflow problems
10. Implementation of Branch and Bound technique to solve knapsack and TSP problems

PRACTICAL : 30
TOTAL : 60

REFERENCES

1. Anany Levitin, ``Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson Education, 2019.
2. Jon Kleinberg and Eva Tardos, ``Algorithm Design'', Pearson Education, 2006.
3. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein, ``Introduction to Algorithms", 3rd Edition, PHI Learning Private Limited, 2012.
4. Steven S Skiena, ``The Algorithm Design Manual", 2nd Edition, Springer, 2008.
5. S Dasgupta, C H Papadimitriou, U V Vazirani,``Algorithms",1st Edition, McGraw Hill Education, 2017.
6. S. Sridhar, "Design and Analysis of Algorithms", Oxford University Press, 2015.
7. Sara Baase and Allen Van Gelder, Computer Algorithms, Third Edition, Pearson Education, 2000.
8. Dexter C. Kozen, The Design and Analysis of Algorithms, Springer-Verlag, 1992

23MCA212 - AGILE METHODS FOR SOFTWARE DEVELOPMENT

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Ascertain the need of software development methodologies with agility and self adaptability features to develop the software which meets the user needs.

CO2 : Compare the practices followed in different agile methodologies and choose the suitable methodology for a given project

CO3 : Synthesize the various agile methodology practices to produce a methodology for a project

CO4 : Develop the system by employing test first programming concept using Junit framework in a application using Scrum or XP methodology

INTRODUCTION TO AGILE DEVELOPMENT AND COMPONENTS OF SDLC

Agile Software Development Ecosystem -Iterative and Evolutionary approach. Evolution of Agile Methodologies - Agile outside Software Development - Revision process-New Release-SDLC Components-Initiate Project planning -Process mapping-Deliverables-Milestones - Evaluate development alternatives-Conceptual design -Sign off (11)

AGILE SOFTWARE DEVELOPMENT ECOSYSTEMS (ASDE)

The Scrum Process - Scrum's Contributions - Dynamic Systems Development Method (DSDM) Principles - The DSDM Process- DSDM's Contributions-Crystal Methodology Design Principles - The Crystal Framework - Crystal Methods - Crystal's Contributions. (11)

FEATURE DRIVEN DEVELOPMENT

The Feature Driven Development(FDD) Process Model - Beyond the FDD process Description - Conceptual Similarities and Differences - FDD's Contributions - Extreme Programming(XP) Basics - XP values and Principles - XP's Contributions - Adaptive Software Development Life Cycle - Leadership-Collaboration Management - ASD's Contributions (11)

DEVELOPING AND DESIGNING AGILE METHODOLOGY

Articulating Ecosystem - Designing Agile Methodology - The Agile Metamorphosis JUnit framework I/O : Automatic Tests - Goal -Fixtures-Testing Exceptions - JUnit's Implementation - JUnit API - Test First Programming - Stub - Other Uses for Tests - Extending JUnit - JUnit and Ant - Running JUnit Standalone - JUnit and IDEs-Test Infection. (12)

TOTAL : 45

REFERENCES

1. Rubin Kenneth S, " Essential Scrum: A Practical Guide to the Most Popular Agile Process", 1 st edition, Addison-Wesley, July 2012.
2. Todaro, Dave, "The Epic Guide to Agile: More Business Value on a Predictable Schedule with Scrum", Kindle edition, R9 Publishing LLC, 2019.
3. Sagar Salunke, "JUnit with examples", 1st edition, O'Reilly Media, Createspace Independent Pub; 2016.
4. Craig Larman, "Agile & Iterative Development, A Manager's Guide", 2nd edition, Pearson Education, 2009.
5. Adkins,"A companion for Scrum Masters, Agile coaches and project managers in Transition", 2nd edition, Addision Wesley Pearson Education,2023
6. Richard Much " The Software Development Life cycle,- A complete guide",1st edition Richard munch Publishing, 2020
7. Pankaj Jalote, "An Integrated Approach to Software Engineering", 3rd edition, Narosa Publishing House Reprint, 2019.

23MCA221 - MACHINE LEARNING LABORATORY

L	T	P	C
0	0	4	2

PRE-REQUISITES

23MCA111, 23MCA123

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Able to prepare data and apply various machine learning.algorithms to solve real world problems.

CO2 : Able to build regression, classification and clustering models using benchmark datasets and give insights.

CO3 : Use Hidden Markov Models and Bayesian Belief networks on real-time datasets and draw insights

CO4 : Implement bagging, boosting and Random Forest methods for classification and regression problems.

CONCEPTS TO BE COVERED

1. Implement the FIND-S algorithm.

2. Demonstrate Decision Tree - ID3 Algorithm

3. Supervised Learning : Classification

i) Implement Naïve Bayes Classifier on a Data set. Test for Accuracy and Precision.

ii) Implement K-Nearest Neighbor Classifier on a Data set. Test for Accuracy and Precision.

4. Implement Artificial Neural Network Algorithms to simulate logical gates.

5. Implementing the Backpropagation algorithm and test the same using appropriate data sets.

6. Implement Bayesian Belief networks

7. Apply EM algorithm to cluster a set of data stored in a .CSV file.

8. Apply reinforcement learning and develop a game of your own.

9. Implement Ensemble learning methods like Bagging, Boosting and Stacking algorithms in building classifiers

23MCA222 - FULL STACK WEB DEVELOPMENT LABORATORY

L	T	P	C
0	0	3	1.5

PRE-REQUISITES:

Consent of the Instructor

ASSESSMENT: PRACTICAL

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

CO1: Apply intermediate and advanced web development practices.

CO2: Implement basic Typescript/JavaScript and create data binding/visualizations in accordance with UI/UX theories.

CO3: Implement a RESTful backend API for storing and retrieving data via AJAX calls..
CO4: Develop a fully functioning website and deploy on a web server.

CONCEPTS TO BE COVERED:

1. Working with, Basic HTML, CSS, JavaScript

2. Creating JavaScript File for TypeScript Objects

3. Install and Test Angular JS with bootstrap[Create an app with Angular JS Controller]

4. Creating custom components and adding it to AppComponent

5. Angular project with data binding

6. Creating Angular project with file directives [IF, FOR, SWITCH, STYLE]

7. Collect and validate data using browser events using DOM

8. Collect data on form submission [Angular JS Routing application]

9. Create a Service Client [Create Angular JS Services]

10. Working with MONGO DB

11. Serverless application with node.js

12. Restful API with node.js

23MCA241 - MINI PROJECT

L	P	T	C
0	0	2	1

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Analyze different domains, identify problems that require software solutions and justify.

CO2 : Choose appropriate problem solving techniques for the identified problem.

CO3 : Practice software engineering principles and programming skills in developing software solutions.

CO4 : Write the project report demonstrating the contribution and complete technical details. Students have to undertake a project approved by their concerned supervisor. Starting From Analysis to implementation, they have to follow software engineering concepts effectively. At the end of the semester, Students have to submit a report. Evaluation of the project will be carried out by a panel of examiners duly constituted twice besides the final presentation.

AREAS FOR PROJECT

1. Application using Android platform

2. Application in Internet of Things

3. Data Analytics / Data Mining applications using latest implementation software.

4. Network based applications

5. Application on Cloud computing

6. Application in Security/Block chain Management

7. Accounting / Commercial / Information Management / Scientific / web applications using latest software.

8. Not limited to the above. Any latest Concepts / Social problems can be considered.

23MCA223 – SOFT SKILLS -I

L	P	T	C
0	0	2	1

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1: Gain confidence, enhance Personality and develop positive attitude in their work and life.
CO2: Effectively communicate and present opinions using appropriate functional expressions for a given situation.
CO3: Compose Emails, Reports for a given business scenario using appropriate sentence construction and in the prescribed format.
CO4: Generate ideas and speak on a given topic in a competitive scenario like Debate, Group Discussion, and Public Speaking.

PERSONALITY DEVELOPMENT

Motivation and Self Confidence, SCOT Analysis - Personality Development – What is Personality, Developing Positive Attitude towards work and life, Building Relationship with others - Personality Development – Paradigms of Human Interaction, Fear Management.

(4)

VERBAL COMMUNICATION

English Conversation – Asking and Giving Opinions - English Conversation –Thanking People, Asking and Giving Suggestions - English Conversation – Asking for Direction, Agreeing and Disagreeing - Role Play-Business.

(4)

BUSINESS COMMUNICATION

Email Writing – Format, Etiquettes and Tips - Report Writing -Introduction, elements and tips - Drafting a report - Error Identification – Rules, Common Mistakes and Exercises - Sentence Completion Filler (fill in the blanks using apt words).

(4)

PUBLIC SPEAKING

How to start and sustain a conversation - Debate - Extempore - Group Discussion – Importance and Process - Public Speaking – Introduction, Tips - Drafting a Public Speech - Interview – Types, Dos and Don’ts - Mock Press.

(3)

REFERENCES

1. John Seelay, Oxford Guide to Effective Writing and Speaking, 2nd Edition, Kindle Edition by Oxford University Press, 2007.
2. Sabina Pillai, Agna Fernandez, Soft Skills and Employability Skills – Published by Cambridge University Press, 2017.

23MCA311 - NETWORK AND CYBER SECURITY

L	P	T	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Analyze the adequate basic security required by any computing system and apply classical and modern cryptography algorithms to protect the confidentiality of information resources across networks

CO2 : Analyze security policies and best practices and apply suitable security technique to achieve integrity, and non- repudiation of information

CO3 : Demonstrate different threats and vulnerabilities of network security and apply suitable security controls to protect internal and external networks

CO4 : Understand threats against various system components and choose a best technique to control the threat

INTRODUCTION TO COMPUTER NETWORKS

Network hardware - Network software - Reference models: OSI – TCP/IP.

CRYPTOGRAPHY : CONCEPTS AND TECHNIQUES

Need for Security - Security Approaches - Principles of Security – Types of Attacks – Information Security: Plain Text and Cipher Text – Classical Encryption Techniques: Substitution Ciphers -Transposition Ciphers - Stream and Block Ciphers - Symmetric and Asymmetric Key Cryptography. ENCRYPTION TECHNIQUES: Data Encryption Standard - Advanced Encryption Standard - Confidentiality using Symmetric Encryption - Public-Key Cryptography and RSA - Diffie-Hellman Key Exchange – Key Management - Symmetric Key Distribution – Kerberos - X.509 Authentication Service. **(15)**

HASH FUNCTIONS AND SIGNATURES

Applications of Cryptographic Hash Functions – Requirements and Security - Description of MD Hash Family – MD5 - Secure Hash Algorithms - SHA-512 - Digital Signatures: Digital Signature Standard - Process - Services - Attacks on Digital Signature - Digital Signature Standard.

(10)

NETWORK SECURITY

Threats in Networks: Vulnerability - Categories of Attack - Software Based Packet Sniffing - Impersonation - Message Confidentiality Threats - Message Integrity Threats - Website Vulnerabilities - DoS - DDoS. Network Security Controls: Security Threat Analysis - Architecture - Encryption - Content Integrity - Strong Authentication - Access Controls - Wireless Security - Alarms and Alerts - Honeypots - Firewalls - Intruders - Intrusion Detection Systems - Types - Goals - Strengths and Limitations - Snort. **(10)**

SYSTEM SECURITY

Program Security: Secure Programs - Nonmalicious Program Errors - Targeted Malicious Code - Controls against Program Threats. Database Security: Security Requirements - Reliability and Integrity - Two-Phase Update - Redundancy / Internal Consistency - Recovery - Concurrency / Consistency - Monitors - Case studies on Cryptography and Security - Single Sign On (SSO). **(10)**

TOTAL : 45

REFERENCES

1. William Stallings, "Cryptography and Network Security - Principles and Practices", 7th Edition, Pearson Education, 2017.
2. Charlie Kaufman, Radia Perlman, Mike Speciner, “Network Security: PRIVATE Communication in a PUBLIC World”, Second Edition, , Pearson Education, 2017.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", 4th Edition, Pearson Education, 2007.
4. Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill, 3rd Edition, 2017.
5. Behrouz A. Forouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata McGraw Hill, 2017.

23MCA331 - VIRTUALIZATION AND CLOUD COMPUTING

L	P	T	C
2	0	2	3

PRE-REQUISITES

23MCA15

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Describe the virtualization technology behind the working of cloud computing. Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure

CO2 : Describe various service delivery models and deployment models of cloud computing architecture

CO3 : Identify security and privacy issues in cloud computing and devise appropriate security solutions for protecting cloud resources.

CO4 : Deploy applications over commercial cloud computing infrastructures such as Amazon Web Services and Google AppEngine.

OVERVIEW OF VIRTUALIZATION

Basics of Virtualization - Virtualization and Cloud Computing - Need of Virtualization - Virtualization Advantages. Virtual Machine Basics - Types of Virtual Machines - Hypervisor Concepts and Types -**Resource Virtualization:** Processor - Memory - Input/Output - Case Study: VMWare - Xen - KVM.

(9)

UNDERSTANDING CLOUD COMPUTING

Cloud Computing - Definition and Characteristics - History of Cloud Computing - Cloud Architecture - Benefits and Challenges of Cloud Computing - Cloud Deployment models: Private cloud - Public cloud - Hybrid cloud. **CLOUD SERVICE MODELS:** Software-as-a-Service - Understanding SaaS - Architecture of SaaS - Platform-as-a-Service - Understanding PaaS - Architecture of PaaS - Infrastructure-as-a-Service - Understanding IaaS – Architecture of IaaS.

(9)

CLOUD SECURITY AND TRUST MANAGEMENT

Privacy and Security in Cloud - Security Service Boundary - Securing Data - Encryption - Data Integrity and Auditing - Identity Management and Access Control - Trusted Computing.

(6)

DISASTER RECOVERY AND SCALING

Disaster Recovery Planning - Disasters in Cloud - Disaster Management - Scaling a Cloud Infrastructure: Capacity Planning - Cloud Scale.

(6)

TOTAL : 30

CONCEPTS TO BE IMPLEMENTED:

1. Creation of Virtual Machines using open source Hypervisors.
2. Communication between host and VM, and between VMs.
3. Migration of Virtual Machine from one host to another host.
4. Developing and deploying applications using public PaaS provider.
5. Creating instances in Amazon EC2 - Deploying and Accessing Applications in Amazon EC2.
6. Create and manage Amazon S3 instances.
7. Upload files to S3 after applying proper security mechanisms to ensure data confidentiality and integrity.

TOTAL : 30

REFERENCES

1. George Reese, "Cloud Application Architectures", 1st Edition, O'Reilly, 2019.
2. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", 1st Edition, Elsevier/ Morgan Kaufmann, 2017.
3. William von Hagen, "Professional Xen Virtualization", Wrox Publications, January, 2008.
4. Tim Mather, Subra Kumaraswamy, Shahed Latif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance", 1st Edition, O'Reilly Media, 2009.

23MCA312 - BIG DATA ANALYTICS

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOMES

CO1: Learn the concepts of big data characteristics and its applications

CO2: Apply data analysis techniques in given use cases from various business domains and exposure to data analytics using various Hadoop ecosystem tools.

CO3: Understand stream processing and perform stream analytics on real-time problems.

CO4: Implement real-time streaming analytics using Spark Streaming API.

INTRODUCTION TO BIG DATA

Classification of Digital Data- Characteristics of Data-Evolution of Big Data-Definition-Challenges-Traditional Business Intelligence versus Big Data. Scalability and Parallel Processing- Designing Data Architecture-Data Sources and Quality-Data Storage and Analysis-Big Data Analytics Applications and Case Studies.

(11)

BIG DATA ANALYTICS & TECHNOLOGIES

State of the Practice in Analytics-Key roles for New Big Data Ecosystem-Data Analytics Lifecycle-Six Phases: Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize -Case Study. Hadoop and its Ecosystem– Hadoop Distributed File System-MapReduce- Hadoop Ecosystem Tools-NoSQL Big Data Management, MangoDB and Cassandra - Spark and Big Data Analytics – Apache Mahout Machine Learning Applications.

(13)

DATA STREAM MINING

Data Stream Concepts and Data Stream Management: Data stream concepts - Data Stream Model - Architecture - Data Stream Management System (DSMS) - Examples of sources of streams - Stream Queries - Stream Processing Issues - Real-time Processing, Stream Processing and Batch Processing - Stream Computing Aspects - Frequent Item sets mining in a Stream.

(11)

REAL-TIME ANALYTICS

Apache Spark Streaming- Real -time Analytics Platform (RTAP) Applications-Case Studies: Real-Time Sentiment Analysis, Positive Negative Sentiments Prediction and Stock Market Prediction.

(10)

TOTAL: 45

REFERENCES

1. Raj Kamal and Preeti Saxena, "Big Data Analytics: Introduction to Hadoop, Spark, and Machine- Learning", McGraw-Hill Education, 2019.
2. Data Science and Big Data Analytics, EMC Educational Services , Wiley, 2015.
3. Kai Hwang and Min Chen, "Big-Data Analytics: for Cloud, IoT and Cognitive Computing", Wiley Edition, 2018.
4. Bill Chambers and Matei Zaharia, "Spark: The Definitive Guide", O'Reilly, 2018.

23MCA321 - NETWORK AND CYBER SECURITY LAB

L	T	P	C
0	0	3	1.5

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Understand the classical crypto systems used for the confidential information exchange and use different ciphers in secure data transfer

CO2 : Demonstrate understanding of security best practices and techniques to preserve confidentiality of information at rest, and in Transit and apply suitable cryptographic algorithm to preserve the confidentiality of information

CO3 : Apply hash and message digest algorithms to preserve the integrity of information

CO4 : Demonstrate the working of network security tools including Packet capturing and Intrusion Detection

CONCEPTS TO BE COVERED

1. Implementing Substitution and Transposition ciphers
2. Applying symmetric encryption algorithms to protect the confidentiality of users data
3. Applying asymmetric encryption algorithms to protect the confidentiality of users data
4. Comparing the performance of symmetric and asymmetric encryption algorithms in terms of computation time and storage space
5. Applying hash and message digest algorithms to ensure the integrity of users data

6 Using standard digital signature scheme to verify the authenticity of user's document

7. Learning to install and work with an open source Packet capturing tool
8. Learning to install and work with an open source Intrusion Detection tool

23MCA322- BIG DATA ANALYTICS LAB

L	T	P	C
0	0	4	2

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1: Write MapReduce programs to work on Hadoop clusters.

CO2: Work with NoSQL -MongoDB for learning basic CRUD operations.

CO3: Learn and apply basic Hadoop commands and read/write data to HDFS

CO4: Perform stream analytics using real time Spark framework.

CONCEPTS TO BE COVERED

1. MapReduce Programming

   a. Word count Program

2. NoSQL operations(MongoDB and Cassandra)

3. Preparing data with Hadoop

4. Basic HDFS commands, Direct file transfer to HDFS

5. Importing data (CSV,Jason) into Hive Tables, using Spark

6. Data import and export with Sqoop

7. Work with Data Streams using Flume (Eg.Web Log Creation)

8. Creating Visualizations using comparison charts, composition, distribution and relationship charts.

9. Real-Time Analytics using SparkStreaming

10. Real-Time Sentiment Analysis

11. Collaborative Filtering

23MCA323 – SOFT SKILLS - II

L	P	T	C
0	0	2	1

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1: Solve objective questions on analogy, Statement and Argument, Statement and Conclusion, Data Sufficiency and Sentence improvement within a given time.

CO2: Construct grammatically correct sentences.

CO3: Speak confidently to describe a process, present information on the specified topic and disseminate information in a professional manner.

SELF EVALUATION

Self believe and self Esteem - Activities based on Current Events

(2)

VERBAL AND LOGICAL REASONING

Analogy - Introduction, Types and Exercises - Statement and Argument - Statement and Conclusion - Data Sufficiency - Sentence Improvement - Critical Reasoning / Theme Detection

(5)

GRAMMAR

Basic Grammar- Subject Verb Agreement - One word substitute - Preposition- Cause and Effect – Basic level questions and Moderate level questions. (4)

PRESENTATION TECHNIQUES

Describing a Process - Presentation Skills – Introduction, Planning and Preparation - Presentation on a Topic - Group Discussion – Dos and Don’ts - Functional Expressions used in Group Discussion - Interview Skills – Ideal Grooming for an interview, Preparing for the Interview

(4)

REFERENCES:

1. Sanjay Kumar, Pushp Lata, Communication Skills SECOND EDITION, published by Oxford University Press, New Delhi, India, 2015.

2. Anthony Manning, Chris Sowton and Craig Thaine, Cambridge Academic English, published by Cambridge University Press, U P, India, 2012.

23MCA441 - PROJECT WORK AND VIVA VOCE

L	P	T	C
0	0	30	15

PRE-REQUISITES

Consent of the Supervisor assigned.

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Comprehensively demonstrate understanding of the software development processes and practices.

CO2 : Work to a professional standard in a specified role.

CO3 : Contribute effectively/co-operatively within a team.

CO4 : Exhibit industry-standards of professionalism in their work through knowledge or use of latest techniques and tools.

PROFESSIONAL ELECTIVES - IT ELECTIVES
23MCAE101 - GRAPHICS AND MULTIMEDIA

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT: THEORY

COURSE OUTCOMES

Upon completion of the course- students will be able to:

CO1: Employ point- line and circle scan conversion algorithms for drawing graphical objects

CO2: Construct a world coordinate scene from its constituent elements (defined in their local coordinate systems) by applying geometric transformations on the constituent elements.

CO3: Define animation sequences using pixel and line graphic formats and create a timeline to run the sequence

CO4: Analyse the performance of image- video- audio- text and graphics data compression techniques.

INTRODUCTION

Graphics hardware - raster and random scan - display devices - input devices -hard copy devices. Implementation algorithms for graphic primitives - line- poly line- circle- ellipse- curves – attributes

GEOMETRIC TRANSFORMATIONS

Two dimensional geometric transformations - translation - scaling - rotation - reflection - shearing - composite transformations. Two dimensional viewing - window port- viewport - clipping - point - line - Cohen-Sutherland- Liang-Barsky- Nicholl-Lee-Nicholl.

(5+6)

Three-Dimensional Geometric Transformations -Translation - Scaling - Rotation - reflection - shearing - affine transforms

COMPUTER ANIMATIONS

Raster methods - double buffering - raster operations - morphing - simulating accelerations - motion Specifications - character animations - motion capture - OpenGL animation procedures.

(3+8)

INTRODUCTIONS TO MULTIMEDIA

Multimedia Applications - Multimedia Systems Architecture - evolving technologies - defining objects - Compression and Decompression - Binary image compression - Color - gray scale- Still-video images - JPEG compression - video Image Compression. **(11)**

FILE FORMATS AND MULTIMEDIA I/O

Flich - text format - TIFF - RIFF - MIDI file formats- JPEG DIB- MPEG- AVI file formats. TWAIN - architecture - setting up new WAVE type. Pen Input- Video image display systems- Print output- Image Scanners- Digital Video and Audio- Video images and animation- Full-Motion video**.** **(12)**

TOTAL: 45

REFERENCES

1. Donald D. Hearn- M. Pauline Baker- Warren- "Computer Graphics with Open GL" - 4th Edition - Prentice Hall- 2010.
2. Prabhat K. Andleigh- KiranThakrar "Multimedia Systems Design"- 1st Edition, Pearson. 2015.
3. James D. Foley- Andries Van Dam- Steven K. Feiner- F. Hughes John- "Computer Graphics Principles and Practices"-Third Edition- Pearsons publications- 2013.
4. Ralf Steinmetz and KlaraNahrstedt- "Multimedia: Computing- Communications and Applications"- Pearson Educations- 2009.

23MCAE102 - ADVANCED DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	0	0	3

PRE-REQUISITES
23MCA113
ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Analyze the background processes involved in queries and determine their impact on database operations and design.

CO2 : Analyze different methods and techniques for parallel and distributed query processing and apply appropriate algorithms for optimizing query execution.

CO3 :Demonstrate the usage of different architecture and design strategies for distributed and Parallel databases.

CO4 : Apply the concepts of SQL for enterprise applications and Design data models for advanced applications using object oriented and other databases.

QUERY PROCESSING

Overview - Measures of query Cost - Selection Operations - Sorting - Join Operations - Other Operations -Evaluation of Expressions. QUERY OPTIMIZATION : Overview-Heuristics in query Optimization **(10)**

PARALLEL DATABASES

Introduction - I/O Parallelism - Interquery Parallelism - Intraquery Parallelism - Intraoperation Parallelism - Interoperation Parallelism. DISTRIBUTED DATABASES: Homogenous and Heterogenous Databases - Distributed Data Storage - Distributed Transactions - Commit Protocols - Concurrency Control in Distributed Databases - Availability - Distributed Query Processing - Heterogeneous Distributed Database - Cloud Based Databases.

(12)

XML

Structure of XML Data - XML Document Schema - Querying and Transformation - Application Program Interfaces to XML - Storage of XML Data - XML Applications. **Object and Object Relational Databases:** Introduction to Complex Objects - Object model of ODMG-ODL - OQL - Object Relational and Extended - Relational Systems - SQL and its Relational Features - Nested Relational Model.

(12)

NoSQL DATABASES

Introduction to NoSQL - SQL vs NoSQL - Types - MongoDB - CRUD Operations - Advantages and Disadvantages.

(11)

TOTAL : 45 Hours

REFERENCES

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 7th Edition, Mc Graw Hill International Edition, 2019.
2. Ramez Elmsari and Shamkant B Navathe, "Fundamentals of Database System ", 7th edition, Pearson Education,2017.
3. Raghu Ramakrishnan, Johannes Gehrke, "Databases Management Systems", 3rd Edition, Graw Hill, 2003.

23MCAE103 - INTERNET OF THINGS

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Understand the basic concepts of Internet of Things, Sensors and Actuators..

CO2 : Understand the IoT requirements for Network Protocols.

CO3 : Understand Fog Computing and Functional requirements.

CO4 : Understand Security and Privacy and applications of IoT.

INTERNET OF THINGS (IOT)

Overview - IoT Reference Framework - The 12 Factors for a Perfect Storm - The Internet in IoT - The Open System Interconnection Model - End-to-End View of the OSI Model - Transmission Control Protocol/Internet Protocol (TCP/IP) - IoT Network Level: Key Performance Characteristics - Internet Protocol.

THE THINGS IN IOT: SENSORS AND ACTUATORS

Introduction - IoT Sensors - RFID - Video Tracking - IoT Actuators

IOT REQUIREMENTS FOR NETWORKING PROTOCOLS

Support for Constrained Devices - Massive Scalability - Determinism.

(11)

IOT PROTOCOL STACK: A LAYERED VIEW

Link Layer - Internet Layer - Application Protocols Layer - Application Services Layer

FOG COMPUTING

Definition - Drivers for Fog - Characteristics of Fog - Enabling Technologies and Prerequisites.

IOT SERVICES PLATFORM: FUNCTIONS AND REQUIREMENTS

IoT Services Platform Functions - IoT Platform Manager - Discovery: Entities, Services, and Location - Communication Manager - Data Management and Repository - Element Manager (Managing IoT Devices - Firmware Manager - Topology Manager - Group Manager - Billing and Accounting - Subscription and Notification Manager - API Manager - Commercially Available IoT Platforms - Putting All Together.

(12)

INTERNET OF THINGS SECURITY AND PRIVACY

Introduction - IoT Security - IoT Security IoT Three-Domain Architecture - Cloud Domain Attacks and Countermeasures - Fog Domain Attacks and Countermeasures - Sensing Domain Attacks and Countermeasures - Securing IoT Devices **(11)**

IOT VERTICAL MARKETS AND CONNECTED ECOSYSTEMS

IoT Verticals - IoT Service Model: Anything as a Service - Enabling “Anything as a Service".

THE BLOCKCHAIN IN IOT .

Introduction and Basics - How Blockchains Work - Features of Blockchain - Blockchain Applications in IoT **(11)**

TOTAL : 45

REFERENCES

1. Ammar Rayes, Samer Salam, " Internet of things from hype to reality _ the road to digitization", Springer, Third Editon, 2022.
2. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahendra Swain, "Internet Of Things With Raspberry Pi And Arduino", CRC Press Taylor & Francis Group, First Edition, 2019.
3. Tyagi, Amit Kumar; "Internet of Things Theory and Practice", BPB Publications, First Edition, 2022

23MCAE104 - SOFTWARE METRICS AND MEASUREMENT

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Analyze the problem to ascertain the type of software measurement.

CO2 : Apply selected statistical methods and enlist the findings of analysis.

CO3 : Interpret and Design the selected metric to match the information reliabilities.

CO4 : Determine a plan to decide what data to collect and who should collect it.

FUNDAMENTALS OF SOFTWARE MEASUREMENT

Measurement in software engineering - scope of software metrics - measurement and models - measurement scales and scale types - classifying software measures - determining what to measure software measurement validation. Software metrics data collection - Analyzing software measurement data: Introduction- Analyzing the results of experiments- Simple analysis Techniques-Overview of statistical tests. (11)

SOFTWARE METRICS

Product quality metrics- In- Process quality metrics - Complexity metrics and models - Size metrics - Effort- cost and time measurement - Object Oriented metrics - software maintenance metrics (11)

SOFTWARE RELIABILITY MEASUREMENT

Basics of reliability theory- software reliability problem- parametric reliability growth models- the recalibration of software reliability growth predictions Tracking software progress - Software project metrics - utilization and efficient project management

(11)

MEASUREMENT AND MANAGEMENT

Planning a measurement program - Metrics plan - developing goals- questions and metrics - mapping measures to activities - measurement tools - measurers- analysts and audience - Measurement in practice. (12)

TOTAL : 45

REFERENCES

1. Stephen H Kan, "Metrics and Models in Software Quality Engineering", 2nd edition, Pearson Education New Delhi, 2014.
2. Norman Fenton and Shari Lawrence Pfleeger, "Software Metrics - A Rigorous & Practical Approach", 3rd edition, Thomson Asia Pvt Ltd, Singapore , 2014.
3. Highsmith J, "Agile Software Development Ecosystems ", 1st edition, Addison Wesley, 2005.
4. Kent Beck, "Junit Pocket Guide", 1st edition, O'Reilly Media, 2004.
5. Craig Larman, "Agile & Iterative Development - A Manager's Guide", 2nd edition, Pearson Education, 2009.
6. Fenton,James M.Biemen,"Software Metrics", 3rd Edition,CRS Press, 2020

23MCAE105 MICRO SERVICE ARCHITECTURE AND RESTFUL SERVICES

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Apply a system approach in deriving business as goal oriented service

CO2 : Analyze the dependencies in learning the tools for best practices

CO3 : Create new application using interfaces and interactions

CO4 : Interpret the handling with authentication and Authorization for deployment

UNDERSTANDING MICROSERVICES

Working-speed of change-Value Proposion -architecture benefits-Deriving business value-goal-oriented – Layered approach-Modularized microservice architecture-cohesive – systematized maturity model –System Approach to microservices -Standardization and coordination

(11)

MICROSERVICES DESIGN PROCESS

Set optimization goals -Development principles-Sketch the system design-Desiging microservice system- Microservices design principles-service design fundamentals for individual microservices -Microservice boundaries and domain driven design-API Design for microservices-Asynchronous message passing-dependencies-tools and technologies-practices and process

(11)

MICROSERVICES AND CONTAINERS

Advantages and Disadvantages -Fatigues and Attributes-Business-Types of interactions - Discovery Service-Creating new application- Docker Installation -Interface -commands Orchestration-Kubernetes-Apache Mesos and Marathon-Swarm-Case Study 1: Monolithic Helpdesk Application, Case Study 2 : Migration to Microservices Case Study 3 : Containerizing a Helpdesk Application- Installing the Solr Search Engine. (11)

RESTFUL SERVICES

Rest APIs with SPA-Open swagger UI-Simplifying RESTful Services with popular Go frameworks -Case Study : Building metro rail API with go-restful-Gin framework-Handling authentication and Authorization-OAuth2.0 workflow-Persisting client sessions with Redis-JSON RPC using Gorilla RPC- Deploying Go and Rest services using Nginx server. (12)

REFERENCES

1. Irakli Nadereishvili, Ronnie Mitra, Matt McLarty, “Microservice Architecture Aligning principles, Practices and Culture”, 1st edition, O Reilly Media Inc, 2016.
2. Parminder Singh Kocher "Microservices and Containers" 1st edition, Pearson Addison Wesley,2018.
3. Divya Vijayan, Richa Tripathi, “Hands on Restful Web Services with Go” , 2nd edition, Packt Publishing, 2020.

23MCAE106 - BLOCKCHAIN TECHNOLOGIES

L	T	P	C
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PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Understand the basics of distributed environment and decentralization.

CO2 : Describe and Analyze the fundamentals of Blockchain and Bitcoin

CO3 : Develop Cryptography algorithms and protect Cryptocurrencies.

CO4 : Examine the development platform ethereum and Hyperledger.

BLOCKCHAIN

Introduction - Distributed Systems- History of blockchain- Introduction to blockchain- Types of blockchain- CAP theorem and blockchain- Benefits and limitations of blockchain. Decentralization - Decentralization using blockchain- methods of decentralization- routes to decentralization- blockchain and full ecosystem decentralization- smart contract- decentralized autonomous organization- corporations- societies- application- Platforms for decentralization - Cryptography.

(12)

CRYPTOCURRENCIES

Cryptographic primitives - Hash Functions- Bitcoin- keys and addresses-Public keys in bitcoinPrivate keys in bitcoin- Bitcoin currency units - Base58Check encoding- Vanity addresses- transactions- Types of transactions- blockchain- bitcoin paymentsAlternative coins - theoretical foundations- bitcoin limitations - Block Chain Technologies.

(11)

SMART CONTRACTS DEVELOPMENT AND ETHEREUM

Smart Contracts - Recardian Contracts - Ethereum - Introduction- ethereum blockchain- elements- precompiled contracts- accountsblock- ether- messages- mining- clients and wallets- trading and investment- symbols- ethereum network- applications- scalability and security.Ethereum development - Setting up a development environment- development tools and clients- Solidity Web3.

(11)

HYPERLEDGER

Hyper ledger Projects - Fabric- Fabric architecture-block chain services- components of fabric- Sawtooth lake -PoET- CORDAArchitecture-components-Nodes-Permission services - Development environment-Case study in block chain management

(11)

TOTAL : 45

REFERENCES

1. Imran Bashir "Mastering Blockchain", 4th edition, Packt Publishing, 2023.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies", 1st edition, Princeton University Press, 2016.
3. Roger Wattenhofer, "The Science of the Blockchain", 3rd edition, Inverted Forest Publishing, 2019.
4. Don and Alex Tapscott, "Blockchain Revolution", 1st edition, Portfolio Penguin, 2016.
5. Andreas M. Antonopoulos, "Mastering Bitcoin: Programming the Open Blockchain", 2nd edition, O'Reilly, 2017.

23MCAE107 - SINGLE PAGE WEB APPLICATIONS

L	T	P	C
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PRE-REQUISITES

Consent of the Instructor

ASSESSMENT: THEORY

COURSE OUTCOME:

Upon completion of the course- students will be able to:

CO1 : Learn to build modern browser-based applications that take advantage of stronger client platforms and more predictable bandwidth.

CO2 : Learn the SPA design approach and explore new techniques like structured java scripts and responsive design

CO3 : Know how to capitalize trends like server side JavaScript and NoSQL data stores

CO4 : Develop frameworks that make JavaScript more manageable and testable as a first class language.

INTRODUCTION

Build first SPA – user benefits of well-written SPA. Re introducing JavaScript – variable scope, hoisting and execution context– scope chain, prototype chain and functions. **(11)**

THE WEB SERVER

Role – the Node.js advance routing, authentication and authorization, Web Socket, Socket.IO. The server database, MongoDB, client data validation, CRUD

(11)

BUILD THE MODEL

Set up the model and files. People object: design and build. Chat model, add avatar support. Chat feature and avatar feature, Data binding and jQuery. Create a data module.

(11)

SPA CLIENT

Files and namespaces. The feature container – create, render and manage. Manage application state. Feature module: strategy, file design method API,. Implementation API, add frequencies.

READYING SPA FOR PRODUCTION

Optimizing SPA for search engines, cloud and third party services, CDN, Caching and Cache Busting.

(8+4)

TOTAL : 45

REFERENCE BOOKS

1. Michael S. Mikowski and Josh C. Powell, "Single Page Web Applications", Manning Publications, September 2018.
2. Chris Love, "High Performance Single Page Web Applications", kindley edition January 11, 2014.
3. Emmit Scott, "SPA Design and Architecture: Understanding Single Page Web Applications", First Edition, Manning Publications, 2015.

23MCAE108 - DIGITAL MARKETING

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT: THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Assess the impact of digital technology on the practice of marketing.
CO2 : Analyze the use of different forms of digital marketing in the development of an online Presence, develop a plan for marketing a product of business online.
CO3 : Integrate social media tools into a marketing communications strategy.
CO4 : Use a publishing platform to build a web presence with integrated data collection and links to social media.

INTRODUCTION TO DIGITAL MARKETING

Need for digital marketing – Commonly used terminology – 4Cs : Customer, Content, Context and Conversation - three essential ingredients: Traffic, Insights and Conversions - Introduction to customer personas, buying process and their usability - Designing a basic digital marketing plan. **Understanding Marketing Management:** Importance, Scope, Core Marketing Concepts, Marketing Tasks. Company Orientation towards Market Place: Evolution, New Marketing Realities. (15)

DEVELOPING MARKETING STRATEGIES

Market Segmentation: Levels, Patterns, Bases, Effective Segmentation Criteria. Targeting: Approaches.Positioning:Steps, Differentiation Strategies. (10)

BUILDING ONLINE PRESENCE

Introduction to Building online presence for businesses – basic terminology and technology – Website Domain: naming, working & registration – Website operation – Hosting website – Introduction to WordPress - basic concepts of linking content using HTML.

Building Traffic: Different techniques for driving traffic or visitors to a website - Introduction to search engine optimization, Social media marketing, referral traffic, display ads, search engine marketing, affiliate marketing and email marketing. (10)

GETTING INSIGHTS

Collect and analyze data of visitors to websites - Introduction to Google Analytics and Google Webmaster Tools – Workings of web analytics - Set up Google Analytics for a website - Set up goals and filters in Google Analytics - Access and interpret reports - Set up and use Google Webmaster Tools for effectiveness of search engine optimization.

Driving Conversions: Convert website visitors into buyers - Basic conversion tracking using Google Analytics and ad platforms - Introduction to Landing Pages - Different types of conversions - Campaign optimization – Learn to create a landing page using UnBounce. (10)

TOTAL: 45

REFERENCE BOOKS

1. Seema Gupta, "Digital Marketing", McGraw Hill, 2018.
2. Philip Kotler, Kevin Lane Keller, Abraham Koshy & MithileshwarJha, "Marketing Management: A South Asian Perspective", 14th Edition, Pearson, New Delhi , 2014
3. Damian Ryan, "Understanding Digital Marketing - Marketing Strategies for Engaging the Digital Generation", 3rd Edition, Kogan Page Ltd., 2014
4. Dave Evans and Jake Mckee, "Social Media Marketing - The Next Generation of Business Engagement", Wiley India pvt. Ltd, New Delhi, 2011.
5. Perry Marshall, Thomas Melloche, "Ultimate Guide to Facebook Advertising", Tata McGraw Hill, New Delhi, 2011.

23MCAE109 - DESIGN THINKING

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PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Understand the basic concepts of Design thinking.

CO2 : Understand the connection of people, Identifying the right problem.

CO3 : Understand how to think differently.

CO4 : Understand how to deliver the values.

DESIGN THINKING BASICS

Design Thinking Explained - A Design Thinking Model for Tech - Design Thinking for Small Audiences - Resilient and Sustainable Teams - Visible and Visual Teamwork

UNDERSTANDING BROADLY

Understanding the Lay of the Land - Connecting with the Right People - Learning and Empathizing - Identifying the Right Problem **(12)**

THINKING DIFFERENTLY

Introduction to Thinking Differently - Guardrails for Thinking Creatively - Exercises for Increasing Creativity - Exercises for Reducing Uncertainty - Thinking for Problem Solving **(11)**

DELIVERING VALUE

Cross-Teaming and Communicating for Outcomes - Prototyping and Solutioning by Doing - Solutioning Small and Fast - Delivering Value at Velocity **(11)**

ITERATING FOR PROGRESS

Testing for Validation - Feedback for Continuous Improvement - Deploying for Progress - Operating at Scale - Making Change Sticky - Design Thinking for Project Velocity **(11)**

TOTAL : 45

REFERENCES

1. George-Anderson, "Design-Thinking for Tech_ Solving Problems and Realizing Value in 24 Hours", Pearson Education,1st Edition, 2023.
2. Kaushik Kumar and Muralidhar Kurni, "Design Thinking - A Forefront Insight", Taylor and Francis, 1st Edition, 2022.
3. Tim Brown, "Change by Design_ How Design Thinking Transforms Organizations and Inspires Innovation -HarperBusiness (2009)
4. Yvonne Eriksson , "Different Perspectives in Design Thinking", CRC Press, 2022

PROFESSIONAL ELECTIVES - DATA SCIENCE ELECTIVES

23MCAE110 ARTIFICIAL INTELLIGENCE

L	T	P	C
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PRE-REQUISITES

23MCA111

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Describe the basic concepts, methods, techniques, tools, components and functions of intelligent agents.

CO2 : Given a search problem, analyze and formalize the problem, select the appropriate search method, and develop the algorithm for it

CO3 : Design and implement logical reasoning agents

CO4 : Describe and implement several of the major approaches to classical planning and analyze and apply the application view of artificial Intelligence.

INTRODUCTION

Foundation of AI - Agents and Environments- Concept of Rationality - Nature of Environments - Structure of Agents.

PROBLEM SOLVING

Problem-Solving Agents and examples - Uninformed and Informed Search Strategies - Heuristic Functions - Local Search Algorithms and Optimization Problems - Local search in Continuous spaces - Searching with Nondeterministic actions and Partial Observations.

ADVERSARIAL SEARCH AND CONSTRAINT SATISFACTION PROBLEMS

Games - Optimal Decisions in Games - Alpha-Beta Pruning. Constraint Satisfaction Problems (CSP) - Backtracking Search for CSPs - Local Search for Constraint Satisfaction Problems - Structure of Problems.

(9)

KNOWLEDGE AND REASONING

Knowledge based Agents - The Wumpus World - Logic - Propositional Logic- Syntax and Semantics of First-Order Logic – Using First-Order Logic - Knowledge Engineering in First-Order Logic - Unification and Lifting - Forward Chaining - Backward Chaining - Resolution - Knowledge Representation.

(14)

PLANNING

Definition of classical planning - Algorithms for Planning as State-Space Search - Planning Graphs - Hierarchical Task Network Planning - Planning and Acting in Nondeterministic Domains - Multi agent Planning.

(9)

TOTAL: 45

REFERENCES

1. Stuart J Russell and Peter Norvig, "Artificial Intelligence- A Modern Approach", 4th edition, Pearson Education Series, 2020.
2. Dan W.Patterson, "Introduction to AI and ES", 1st edition, Pearson Education, 2007
3. M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", 1st Edition, Jones and Bartlett Publishers, Inc., 2008.
4. Elaine Rich, Kevin Knight, Shiva Shankar B Nair, "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2013.
5. David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, 2010.

23MCAE111 - INFORMATION RETRIEVAL

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PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Understand algorithms and techniques for information retrieval.

CO2 : Design a search engine or any text retrieval system.

CO3 : Apply data mining techniques and quantitative evaluation methods for IR System development applications with retrieval capabilities

CO4 : Combine aspects of information visualization and mining for information retrieval and web information retrieval.

BASICS OF INFORMATION RETRIEVAL

Boolean Retrieval - The Term Vocabulary and Posting Lists - Scoring- Term Weighting and the Vector Space Model - Computing Scores in a Complete Search System - Evaluation in Information Retrieval. **(11)**

IR MODELS

XML Retrieval - Probabilistic Information Retrieval : Review - Ranking Principle Binary Independence Model - Language Models for Information Retrieval : Language Models - Query Likelihood Model **(11)**

TEXT CLASSIFICATION AND SVM MODEL

Text Classification and Naïve Bayes : Text Classification Problem - Naïve Bayes Text Classification Bernoulli Model - Properties of Naïve Bayes - Feature Selection. Support Vector Machines and Machine Learning on Documents : SVM Models - Machine Learning methods **(11)**

CLUSTERING AND MATRIX DECOMPOSITIONS

Flat Clustering : Problem Statement - K-means - Hierarchical Clustering: Agglomerative Clustering - Centroid Clustering - Divisive Clustering - Matrix Decompositions and Latent Semantic Indexing Web Search Basics - Web Crawling and Indexes : Overview - Crawling - Link Analysis : Pagerank. **(12)**

TOTAL : 45

REFERENCES

1. Anuradha D Thakare “Hybrid Intelligent Systems for Information Retrieval”,1st edition, Chapman & Hall, 2023
2. Ricardo Baeza-Yates, Berthier Ribeiro-Neto, “Modern Information Retrieval: The concepts and Technology behind Search” 2nd edition ,ACM Press Books, 2017.
3. D.A. Grossman, O. Frieder, “Information Retrieval: Algorithms and Heuristics”, 1st edition , Springer, 2014
4. Bruce Croft, Donald Metzler and Trevor Strohman, “Search Engines: Information Retrieval in Practice”, 2nd edition, Addison Wesley, 2019.
5. Mark Levene, “An Introduction to Search Engines and Web Navigation”, 3rd edition Wiley, 2015.
6. Christopher Manning, Prabhakar Raghavan and Hinrich Schutze, "Introduction to Information Retrieval", 2nd edition, Cambridge University Press, 2018.

23MCAE112 DEEP LEARNING

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PRE-REQUISITES

Consent of the Instructor

ASSESSMENT: THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1: Explain how traditional feed-forward networks are constructed and why they can approximate almost any function.

CO2: Summarise the key components in convolutional neural networks (CNNs) and their key advantages.

CO3: Describe common types of recurrent neural networks (RNN) and their applications.

CO4: Apply popular Deep learning models to their research problems.

INTRODUCTION

Deep Learning: Overview of Methods, Learning, Numerical, Machine Learning Basics.

Deep Feed-forward Networks: Gradient-Based Learning, Hidden Units, Architecture Design, Back Propagation and other Differentiation Algorithms

(12)

REGULARIZATION AND OPTIMIZATION FOR DEEP LEARNING

Regularization: Parameter Norm Penalties – Norm Penalties as Constrained Optimization – Regularization and Under-Constrained Problems- Dataset Augmentation – Noise Robustness – Semi-Supervised Learning – Multi-Task Learning – Early Stopping.

Optimization: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Method, Optimization Strategies and Meta-Algorithms

(15)

CONVOLUTIONAL NETWORKS

The Convolution Operation – Motivation – Pooling – Convolution and Pooling – Variants of Basic Convolution Function – Structured Outputs – Data Types – Efficient Convolution Algorithm – Random or Unsupervised Features.

(7)

RECURRENT AND RECURSIVE NETS

Unfolding Computational Graphs – Recurrent Neural Networks (RNNs) – Bidirectional RNNs – Encoder-Decoder Sequence-to-Sequence Architectures – Deep Recurrent Networks – Recursive Neural Networks – Long-Term Dependency Challenges – Long Short-Term Memory and Gated RNNs; Practical Methodology; Applications .

(11)

TOTAL: 45

REFERENCE BOOKS

1. Ian Goodfellow, Yousha Bengio and Aaron Courville, " Deep Learning", MIT Press, 2016.

2. Francois Chollet, "Deep Learning with Python", Manning Publications, 2018

3. Li Deng and Dong Yu, " Deep Learning Methods and Applications", Now Publisher, 2013.

20MCAE113 - DATA MINING AND WAREHOUSING

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 Examine a given dataset identify the analysis goals and providing data mining solutions to achieve those goals.

CO2 : Choose proper pre-processing techniques by studying the characteristics of the attributes of the dataset and prepare it for data mining.

CO3 : Apply association rule mining techniques such as Apriori and FP-Tree to a given dataset and generate association rules from it.

CO4: Analyze the suitability of classification (Decision Tree) and clustering algorithms(K-Means and K-Medoids) for a given data analysis requirement.

INTRODUCTION

Definition- Need for Data Mining- Kinds of Data and Patterns- Applications and Issues. Types of data: Data objects and Attribute- Types- Measuring Data Similarity and Dissimilarity. Data Preprocessing: Overview- Data Cleaning-Data Integration-Data Reduction- Data Transformation-Data Discretization. **(12)**

DATA WAREHOUSE AND OLAP TECHNOLOGY

Data Warehouse-Basic Concepts-Data Warehouse Modeling-Data Warehouse Implementation **(11)**

ASSOCIATION AND CLASSIFICATION TECHNIQUES

Mining Frequent Patterns and Associations : Basic Concepts-Frequent Itemset Mining Methods. Classification : Basic Concepts-Decision Tree Induction- Bayes Classification Methods. **(11)**

CLUSTER AND OUTLIER ANALYSIS

Cluster Analysis Concepts-Partitioning Methods-Hierarchical Methods : Agglomerative and Divisive Hierarchical Clustering-BIRCH. Outlier Detection : Outliers and Outlier Analysis-Outlier Detection Methods.

MINING COMPLEX DATA TYPES

Mining Sequence Data-Mining Graphs and Networks-Mining Other Kinds of Data- Visual and Audio Data Mining. **(11)**

TOTAL : 45

REFERENCES

1. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining - Concepts and Techniques", 3rd Edition, Elsevier Publications, 2012.
2. Paul C. Zikopoulos, Chris Eaton, Dirk deRoos and George Lapis, "Understanding Big Data", Mc-Graw Hill, 2012.
3. Arun K. Pujari, "Data Mining Techniques", Universities Press, 2009.
4. Mohammed J. Zaki, Wagner Meira, “Data Mining and Machine Learning : Fundamental Concepts and Algorithms", 2nd Edition, Cambridge University Press, 2020.

23MCAE114 COMPUTATIONAL INTELLIGENCE

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PRE-REQUISITES

Consent of the Instructor

ASSESSMENT: THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1: To solve a given application, can apply Evolutionary programming techniques.

CO2: To solve a given application, can apply swarm intelligence techniques.

CO3: Develop and implement a basic trainable neural network for a computing application.

CO4: Develop and implement a basic fuzzy logic system for a typical computing application.

INTRODUCTION

Introduction to Computational Intelligence - Computational Intelligence Paradigms.

ARTIFICIAL NEURAL NETWORKS

Artificial Neuron - Supervised Learning Neural Networks - Unsupervised Learning Neural Networks - Radial Basis Function Networks - Reinforcement Learning.

(15)

EVOLUTIONARY COMPUTATION

Introduction - Genetic Algorithms - Genetic programming - Evolutionary Programming.

(10)

COMPUTATIONAL SWARM INTELLIGENCE

Basic Particle swarm optimization - Social Network Structure - Basic variations - Basic PSO parameters - Single solution Particle optimization - Applications.

(10)

ARTIFICIAL IMMUNE SYSTEM and FUZZY SYSTEMS AIS

Natural Immune system - Artificial immune models. Fuzzy Systems: Fuzzy sets - Fuzzy logic reasoning - Fuzzy controllers - Fuzzy Sets.

(10)

TOTAL : 45

REFERENCE BOOKS

1. Andries P. Engelbrecht, "Computational Intelligence: An Introduction", 2nd edition, John Wiley and Sons, 2007.
2. Eberhart, E. and Y. Shi., “Computational Intelligence:Concepts and Implementations”, Morgan Kaufmann, San Diego, 2007.
3. Konar, A., “Computational intelligence : Principles, Techniques, and Applications”, Springer, Berlin, Germany, 2005.

PROFESSIONAL ELECTIVES - MANAGEMENT ELECTIVES

23MCAE115 - ORGANIZATIONAL BEHAVIOR

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PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOME

Upon completion of the course, students will be able to

CO1 : Given a case study, analyze the behavior of the individual.
CO2: Given a case study, analyze the behavioral pattern of group interaction in an organization
CO3: Given a scenario in an organization assess the attitude and personality of the individuals in the organization.
CO4: Given a business problem form groups and find a solution to the problem, apply emotional intelligence to solve the problem.

INTRODUCTION TO ORGANIZATIONAL BEHAVIOR

Concept- Nature- Characteristics- Conceptual Foundations and Importance- Models of Organizational Behavior- Management Challenge- A Paradigm Shift- Relationship with Other Fields- Organizational Behavior : Cognitive Framework- Behavioristic Framework and Social Cognitive Framework

PERCEPTION AND ATTRIBUTION

Concept- Nature- Process- Importance. Management and Behavioural Applications of Perception. Attitude: Concept- Process and Importance- Attitude Measurement. Attitudes and Workforce Diversity. Personality: Concept- Nature- Types and Theories of Personality Shaping- Personality Attitude and Job Satisfaction.

Learning : Concept and Theories of Learning. **(4+7)**

MOTIVATION

Concepts and Their Application- Principles- Theories- Employee Recognition- Involvement- Motivating a Diverse Workforce. Leadership: Concept- Function- Style and Theories of Leadership-Trait- Behavioural and Situational Theories. Analysis of Interpersonal Relationship- Group Dynamics: Definition- Stages of Group Development- Group Cohesiveness- Formal and Informal Groups- Group Processes and Decision Making- Dysfunctional Groups. **(11)**

ORGANIZATIONAL POWER AND POLITICS

Concept- Sources of Power- Distinction Between Power- Authority and Influence- Approaches to Power- Political Implications of Power: Dysfunctional Uses of Power. Knowledge Management & Emotional Intelligence in Contemporary Business Organisation.
(11)

ORGANIZATIONAL CHANGE

Concept- Nature- Resistance to change- Managing resistance to change- Implementing Change- Kurt Lewin Theory of Change.

CONFLICT

Concept- Sources- Types- Functionality and Dysfunctionality of Conflict- Classification of Conflict Intra- Individual- Interpersonal- Intergroup and Organizational- Resolution of Conflict- Meaning and Types of Grievance and Process of Grievance Handling. Stress: Understanding Stress and Its Consequences- Causes of Stress- Managing Stress. Organizational Culture: Concept- Characteristics- Elements of Culture- Implications of Organisation culture- Process of Organizational Culture.

(4+8)

TOTAL : 45

REFERENCE BOOKS

1. Newstrom John W., "Organizational Behaviour: Human Behavour at Work", 12th Edition, Tata McGraw Hill- 2017.
2. Luthans Fred, "Organizational Behaviour", 3rd edition, Tata McGraw Hill., 2019.
3. Judge and Stephen P.Robbins,"Organizational Behavior", 13th edition, Pearson, 2020.
4. Ace simpson, stewart Clegg, "Positive Organizational Behaviour- A reflective approach", 5th edition, Taylor & Francis, 2020

23MCAE116 - PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT: THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Describe the principles of management.

CO2 : Given a business plan, specify the management functions (planning- organizing- controlling and evaluating)

CO3 : Construct the organizational chart for a given company.

CO4 : Prepare a flow chart of the selection process of a given company.

MANAGEMENT

Concept- Nature- Importance- Management : Art and Science- Management as a Profession- Management Vs. Administration-Management Skills- Levels of Management- Characteristics of Quality Managers. Evolution of Management: Early contributions-Taylor and Scientific Management- Fayol's Administrative Management- Bureaucracy- Hawthorne Experiments and Human Relations- Social System Approach- Decision Theory Approach. Business Ethics and Social Responsibility: Concept- Shift to Ethics- Tools of Ethics.

(9)

INTRODUCTION TO FUNCTIONS OF MANAGEMENT

Planning :Nature- Scope- Objectives and Significance of Planning- Types of Planning- Process of Planning-Barriers to Effective Planning- Planning Premises and Forecasting- Key to Planning- Decision Making. Organizing: Concept- Organisation Theories- Forms of Organizational Structure- Combining Jobs: Departmentation- Span of Control- Delegation of Authority- Authority & Responsibility- Organizational Design.

(11)

STAFFING and LEADERSHIP

Concept- System Approach- Manpower Planning- Job Design- Recruitment & Selection- Performance Appraisal Directing: Concept- Direction and Supervision Motivation: Concept- Motivation and Performance- Theories Of Motivation- Approaches for Improving Motivation- Pay and Job Performance- Quality of WorkLife- Morale Building. The Core of Leadership: Influence- Functions of Leaders- Leadership Style- Leadership Development.

(11)

COMMUNICATION

Communication Process- Importance of Communication- Communication Channels-Barriers to Communication. **Controlling:** Concept- Types of Control- Methods: Pre-control: Concurrent Control: Post-control- An Integrated Control System- The Quality Concept Factors affecting Quality- Developing a Quality Control System- Total Quality Control- Pre-control of Inputs- Concurrent Control of Operations. Post Control of Outputs. Change and Development: Model for Managing Change- Forces for Change- Need for Change- Alternative Change Techniques- New Trends in Organizational Change.

(7)

TRAINING AND DEVELOPMENT

Need for training- advantages of training programme- Types of training programmes- Training methods- Selection of a training method- Evaluation of training and development- Training practices in India.

(7)

TOTAL: 45

REFERENCES

1. Robbins S.P., Coulter Mary & Niharika Vohra, "Management", 10th Edition, Pearson Education, 2019.
2. S.A. Sherlekar, "Ethics in Management", Himalayan Publishing Company, 2016.
3. H.R. Appannaiah, G Dinakar, H.A. Bhaskar, "Principles of Management", 6th Edition, Himalaya, 2019.
4. Dr. L.M. Prasad, "Principles and practise of management", 10th Edition, Sultan chand & sons, 2020.

23MCAE117 - ACCOUNTING AND FINANCIAL MANAGEMENT

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT THEORY

COURSE OUTCOME:

Upon completion of the course, students will be able to:

CO1: Prepare books of accounts and verify correctness using trial balance, for any business organization.

CO2: Prepare statements of final accounts to ascertain the profit,for any trading or manufacturing organization.

CO3: Perform cost estimation and determine the optimum cost/price/profit for a firm using Cost Sheet, CVP analysis and Marginal Costing Techniques.

CO4: Prepare financial statements using ratio analysis, budgeting, working capital management, capital budgeting and budgetary control techniques and present facts to assist in strategic decision making,

FINANCIAL ACCOUNTING

Introduction : Accounting Concepts, Principles and Conventions - basic accounting procedures - Journal and Ledger, Trial Balance.

FINAL ACCOUNTS

Manufacturing and Trading Account - Profit and Loss Account - Balance Sheet. Final accounts with adjustments - Working with excel worksheets for automating Final Accounts. Depreciation. Type - Straight Line Method - Written-Down Value Method, Sinking Fund Method - Preparation of Depreciation Account.

(5+6)

COST ACCOUNTING

Methods and Techniques of Cost Accounting - Classification of Cost - Material Cost, Labour Cost, Overheads, Fixed and Variable Costs, Cost-Volume-Profit Analysis - Marginal Costing and Decision Making.

(11)

FINANCIAL MANAGEMENT

Objective and scope of Financial Management - Analysis and Interpretation of Financial Management Ratio Analysis - financial system - Working Capital Management - Capital Investment Decision Through Pay-back Period Method - Average Rate of Return - Internal Rate of Return - Cost of Capital - Discounted Cash Flow Analysis by using SpreadSheet.

(12)

BUDGETING AND BUDGETARY CONTROL

Types of budgets - Preparation of various functional budgets - Preparation of cash budget - Flexible budget - Advantages of Budgeting and budgetary control. **(11)**

TOTAL : 45

REFERENCE BOOKS

1. M. C. Shukla, T. C. Grewal,S.C.Gupta , "Financial Accounting I", Paperback, Sultan Chand & Sons, 2019.
2. Maheshwari S.N., Dr Suneel K. Maheshwari, CA Sharad K. Maheshwari, "Principles of Management Accounting", Sultan Chand & Sons, 2021.
3. R L Gupta & V K Gupta, "Principles and Practice of Accountancy", Fourteenth Revised and Enlarged Edition, S.Chand & Co.,Ltd., 2019.
4. Jain S.P. & Narang K.L., "Advanced Accountancy - Principles of Accountancy Vol 1", paperback, Kalyani Publishers, 2018.
5. Sashi K. Gupta & R.K Sharma, Neeti Gupta "Management Accounting", Kalyani Publishers, 2014.
6. Khan M.Y. and Jain P.K., "Financial Management", Seventh Edition , Tata McGraw hill, 2017.

23MCAE118 - E-COMMERCE

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Specify Infrastructural requirements & Business models for an e-commerce start up. (From the perspective of Indian Businesses)

CO2 : Analyze different types of e marketing and e advertising strategies and e-payment alternatives commonly used in the industry and summarize the relative merits in the Indian socio economic scenario.

CO3 : Discuss trends in CRM- SCM and Knowledge Management using web technologies and point out the suitable adaptations for a medium scale e-commerce firm in India.

CO4 : Understanding ERP and EDI technologies can transform the Indian Business environment into paperless, cashless, easy-to-manage and regulated, with the use of cloud and open source Technologies.

INTRODUCTION

History - Early Business Information Interchange Efforts - Emergence of internet- WWW. E-Commerce - Advantages- Disadvantages - BAM Models - Transition to E-Commerce in India- E-Transmission Challenges- The Information Technology Act 2000 - Business Models - Enabling Technologies of WWW. Social Networks- Auctions- Portals: Social networks and online communities Online auctions - E-commerce portals. (9)

ELECTRONIC MARKETING- SECURITY AND PAYMENT

Traditional Marketing - Web Presence Goal - Browsing Behavior Model - Online Marketing- E-Advertising- Trends- E-branding- Strategies. E- Security - Internet Security- E-business Risk Management Issues- Information Security Environment in India. EPayment - Concerns in Internet Banking- Digital Payment Requirements- Token Based E-Payment Classification- E-Cash- Cheque Payment- Risk and E-Payment. (10)

CRM- SCM & SKM

E-CRM Solutions - Business Touch Points - Case Studies. Supply Chain - The new way- e-logistics- Fulfilling Customer's Needs- Smart Chains Smarter Gains. Real Time Benefits and Strategies - Advantages. Knowledge as Key Business Asset- Changes in - Global Business Economy- Technology. Knowledge - Definition- Management - Knowledge Management- Data Warehousing and Data Mining. Virtual value chain - 7 Dimensions - E-Commerce Strategy - planning E-Commerce Project.

(11)

MOBILE COMMERCE AND TECHNOLOGIES

E-Business Portals. What? - Issues - Wireless- Cellular- Wireless Spectrum. - Success Stories. Technologies - mobile commerce- WAP Wireless Generations. Portals - Different Types- benefits- features. Requirements for Intell. **Erp & Edi :** Introduction -ERP and E2RP - Business Problems- New Paradigm- Drivers - Business processes and supporting processes. Architecture- Implementation- ERP Processes. ERP - Cloud and Open Sources.EDI - Concepts and Technology.

(15)

TOTAL: 45 Hours

REFERENCES

1. P.T. Joseph S.J, "E-Commerce - An Indian Perspective", 4th Edition, PHI Learning Private Limited, 2012.
2. Kenneth C. Laudon, "E-Commerce : Business - Technology - Society", 4th Edition, Pearson, 2012.
3. Sandeep Desai, Abhishek Srivastava, "ERP to E2RP - A Case Study Approach", Eastern Economy Edition, PHI Learning Pvt. Ltd., 2013.
4. Kamalesh K. Bajaj, Debjani Nag, "E-Commerce - The Cutting Edge of Business", 2nd Edition, McGraw Hill Education (India) Private Limited, 2005.
5. Ravi Kalakota- Marcia Robinson, "E - Business 2.0 - Roadmap for Success", Addison Wesley Professional, 2001.

23MCAE119 - ENTREPRENEURSHIP DEVELOPMENT

L	T	P	C
3	0	0	3

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOME

Upon completion of the course, students will be able to

CO1 : Understand the role of entrepreneurship in the economic development of a country
CO2 : Formulate the business plans for an efficient and successful business.
CO3 : Justify the need for developing rural entrepreneurship and agripreneurship in India
CO4 : State the economic factors influencing the emergence and development in country

ENTREPRENEURSHIP

Entrepreneur - Types of Entrepreneurs - Difference between Entrepreneur and Intrapreneur - Entrepreneurship in Economic Growth- Factors Affecting Entrepreneurial Growth. Motivation: Major Motives Influencing an Entrepreneur - Achievement Motivation Training- Self Rating - Business Games- Thematic Apperception Test - Stress Management - Entrepreneurship Development Programs - Need - Objectives. Rural entrepreneurship and agri-preneurship development.

(12)

BUSINESS

Small Enterprises - Definition- Classification - Characteristics- Ownership Structures - Project Formulation - Steps involved in setting up a Business - identifying- selecting a Good Business opportunity- Market Survey and Research- Techno Economic Feasibility Assessment - Preparation of Preliminary Project Reports - Project Appraisal - Sources of Information - Classification of Needs and Agencies.

(11)

FINANCING AND ACCOUNTING

Need - Sources of Finance- Term Loans- Capital Structure- Financial Institution- Management of working Capital- Costing- Break Even Analysis- Taxation - Income Tax- Excise Duty - Sales Tax.

(11)

SUPPORT TO ENTREPRENEURS

Sickness in small business - Concept- Magnitude- Causes and Consequences- Corrective Measures - Business Incubators - Government Policy for Small Scale Enterprises - Growth Strategies in small industry - Expansion- Diversification- Joint Venture- Merger and Sub Contracting.

(11)

TOTAL: 45

REFERENCE BOOKS

1. Donald F Kuratko, "Entrepreneurship Theory Process and Practice",10th Edition, Cengage Learning, 2016.
2. Khanka. S.S., "Entrepreneurial Development" S.Chand & Co. Ltd., Ram Nagar, New Delhi, 2013.
3. Hisrich R D, Peters M P, "Entrepreneurship", 8thEdition,Tata McGraw-Hill, 2013.
4. Poornima M Charantimath “Entrepreneurship Development And Small Business Enterprise”, Pearson Publication, PaperBack, 2006.

PROFESSIONAL ELECTIVES LABORATORIES

23MCAE201 DEEP LEARNING LABORATORY

L	T	P	C
0	0	3	1.5

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course, the students will be able to

CO1: Demonstrate how traditional feed-forward networks are constructed and why they can approximate almost any function.

CO2: Implement the key components in convolutional neural networks (CNNs) and their key advantages.

CO3: Describe common types of recurrent neural networks (RNN) and their applications.

CO4: Apply popular Deep learning models to their research problems.

CONCEPTS TO BE COVERED

Implement the following concepts using Python and use the necessary libraries like Tensorflow, Keras,Theano, Torch, etc.,

1. Logistic Regression

2. Multilayer perceptron

3. Deep Convolutional Network

4. Linear Factor Models : PCA, ICA etc.

5. Auto Encoders, Denoising Autoencoders

6. Monte Carlo methods

7. Stacked Denoising Auto-Encoders Restricted Boltzmann Machines

8. Deep Belief Networks

23MCAE202 - GRAPHICS AND MULTIMEDIA LABORATORY

L	T	P	C
0	0	3	1.5

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOME:

Upon completion of the course, students will be able to:

CO1 : Design graphical primitives using algorithms and perform 2D Transformations.
CO2 : Design interactive graphics applications.
CO3 : Design objects and layers for scenes in animation.
CO4 : Develop animated application software.

CONCEPTS TO BE COVERED

COMPUTER GRAPHICS

1. Primitive Algorithms - Line - Bresenham- DDA- Midpoint. Circle - Midpoint- Trigonometric Ellipse - Midpoint- Trigonometric
2. Polygon- Polygon Filling.
3. Transformations - 2D Translation - Scaling- Rotation

MULTIMEDIA AND ANIMATIONS

1. Flash Programming (OR) Maya
2. Creating Layers- Symbol objects- effects for objects
3. Creating scene by combining objects and layers
4. Creating Animations using various technologies
5. Creating Interactive Animation.
6. Adding audio to animations
7. Creating small animation projects.

20MCAE203 - INTERNET OF THINGS LABORATORY

L	T	P	C
0	0	3	1.5

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Work in the Arduino environment.

CO2 :Access the sensors and collect the data from the sensors.

CO3 :Access database from Raspberry Pi.

CO4 :Process SQL queries in Raspberry Pi..

CONCEPTS TO BE COVERED

1. Sense the Available Networks Using Arduino
2. Measure the Distance Using Ultrasonic Sensor and Make Led Blink Using Arduino
3. Detect the Vibration of an Object Using Arduino
4. Connect with the Available Wi-Fi Using Arduino
5. Sense a Finger When it is Placed on Board Using Arduino
6. Temperature Notification Using Arduino
7. LDR to Vary the Light Intensity of LED Using Arduino
8. MySQL Database Installation in Raspberry Pi
9. SQL Queries by Fetching Data from Database in Raspberry Pi
10. Switch Light On and Off Based on the Input of User Using Raspberry Pi

23MCAE204 - USER INTERFACE LABORATORY

L	T	P	C
0	0	3	1.5

PRE-REQUISITES:

Consent of the Instructor

ASSESSMENT: PRACTICAL

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

CO1: Construct navigation for easy task accomplishment and configure forms with focus input

CO2: Determine the data to display on user needs after a contextualize processing using search, sort and filter patterns

CO3: Create contextualize interactions and enable users make social connections

CO4: Use feedback and help patterns to improve clarity

CONCEPTS TO BE COVERED:

1. Understand the Containers like Window, Frame, Panel, Pane, Edit Window
2. Navigation, Menu and Interfaces
3. Interactive Forms and Input Validations
4. Display screens with apt information
5. Making social interactions and connections
6. Enable feedback options and help icons
7. Creating Dashboards
8. Allow Customization option

23MCAE205 - MOBILE APPLICATIONS DEVELOPMENT LABORATORY

L	T	P	C
0	0	3	1.5

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Use the components of Android development environment for mobile application

CO2 : Design GUI forms using layouts,views, event handling, notifications and content providers in Android studio developing that make use of camera and media player.

CO3 : Implement database applications using SQLite and perform CRUD operations

CO4 : Use location based services,network services, graphics to develop innovative mobile apps

CONCEPTS TO BE COVERED

1. Android Development Environment Download and Install SDK and ADT Working of Eclipse and Android Emulator
2. Generic UI development Views and View groups Event Handling and Listeners Layouts and spinner
3. Storing and Retrieving Data Android storing and retrieving data using SQL file Working with content provide
4. Notification and Alarms
5. Action Bars-Menus-Dialogs Notifications and Toast
6. Camera and Media player Camera Application Media player and media recorder
7. Location Based Services
8. Finding locations and Tracking Movement Map based activity and Proximity alerts Communication via Network and Web SMS and MMS
9. Bluetooth and WI-FI
10. Graphics and Animation - Different shapes of different colors changing directions
11. Tweened animation

23MCAE206 - DIGITAL MARKETING LABORATORY

L	T	P	C
0	0	3	1.5

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOME

Upon Completion of the course, the students will be able to:

CO1 : Generate market context with practical needs of digital marketing.
CO2 : Develop conversational interfaces with customers using connection oriented/connectionless services.
CO3 : Analyze a web site and its traffic using tools and understand the methods of optimizing the website for search engines.
CO4 : Know the improved latest technologies for efficient marketing

CONCEPTS TO BE COVERED

1.Customer, Content and Conversation Management

2.Improve visits for a web site

a. Meta element keywords (Search Engine Optimization)

b. Push advertisement

c. Email marketing

3.Analysing a web site using tools

4.Page ranking methods

5.Develop android app

6.Chat bot facilities / Voice Automation Facilities

23MCAE207 - DATA MINING LABORATORY

L	T	P	C
0	0	3	1.5

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Learn to use open source data mining tools such as Weka and/Rapidminer and build data mining applications using these tools.

CO2 : Select appropriate data pre-processing techniques to be applied on standard datasets various domains such as healthcare, finance, insurance etc and prepare the data for the mining process based on the analysis goal.

CO3 : Apply association rule mining techniques to derive useful and new pattern information from the given datasets.

CO4 : Apply classification algorithms to classify a given dataset and derive useful and new insights from the dataset.

CONCEPTS / TOOLS USED

1. Weka/Rapid Miner can be used.
2. Algorithm can be implemented using Python/Java or any other Programming language. Inbuild library may be avoided.

Any Online Data set may be used.

1. Apply pre-processing techniques on datasets such as Discretization, Eliminating Outliers
2. Apply core data mining techniques on different datasets.
3. Association Rule mining algorithms such as Apriori, FP Tree and other algorithms.
4. Classification algorithms - Decision Tree, Naïve Bayesian, Nearest neighbor, etc.
5. Clustering algorithms - K-Means, K-Medoids, DBSCAN, hierarchical clustering algorithm
6. Detect anomalies using any clustering algorithm.
7. Application of text mining algorithms.
8. Use different data visualization techniques to display the mined results and derive inference from them. Shiny tool can be used apart from the usual data mining tools.

23MCAE208 COMPUTATIONAL INTELLIGENCE LABORATORY

L	T	P	C
0	0	3	1.5

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1: Employ Evolutionary programming techniques to solve any real world scenarios.

CO2: Apply swarm intelligence techniques to solve a given application.

CO3: Develop and implement a basic trainable neural network for a computing application.

CO4: Develop and implement a basic fuzzy logic system for a typical computing application.

CONCEPTS TO BE COVERED

1. Implement Artificial Neural Network Algorithms to solve simple classification problems.
2. Implement Genetic Algorithm to solve optimization problems.
3. Implement PSO to solve optimization problems.
4. Implement Artificial Immune System.
5. Implement the different Fuzzy Membership functions, Fuzzy set operations and its properties and composition of Fuzzy and Crisp Relations.

23MCAE209 ARTIFICIAL INTELLIGENCE LABORATORY

L	T	P	C
0	0	3	1.5

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1: Design and implement heuristic search procedures

CO2: Develop constraint satisfaction problem solution

CO3: Design and implement solutions for classical Artificial Intelligence problems

CO4: Design and implement knowledge based system

CONCEPTS TO BE COVERED

1. Implementing state space search algorithms for solving puzzle problems.

- · A* Search
- · Hill-climbing Search.

2. Implementation of MiniMax Search Procedure with alpha beta pruning for finding the solutions of games.

3. Implementation of Constraint Satisfaction Problem for solving Crypt-arithmetic.

4. Develop a knowledge base system consisting of facts and rules about some specialized knowledge domain of your choice.

5. Implementation of Unification algorithm by considering Resolution concept.

6. Designing a Chat bot application.

7. Solve the classical Water Jug problem.

8. Solve the classical Monkey Banana problem.

9. Solve the classical Blocks World problem.

10. Development of programs for simulation of computer games like: Tic-Tac-Toe, N-queens Problems, travelling salesman problem, Chess, etc.

BRIDGE COURSES

SEMESTER I

23MCAB121 PROBLEM SOLVING TECHNIQUES

L	T	P	C
1	0	0	0

PRE-REQUISITES:

Consent of the Instructor

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Write suitable algorithms for the given problem and analyze its efficiency

CO2 : Select a suitable dimension of array data structure and manipulate it.

CO3 : Understand the concept of Abstract Data types and choose appropriate ones for the scenario.

CO4 : Solve problems using non linear data structures like tree and graph

ASSESSMENT: THEORY

INTRODUCTION TO COMPUTER PROBLEM SOLVING

Algorithms - Building blocks of algorithms (statements, control flow, functions) -Notation (pseudo code, flow chart) - Algorithmic problem solving - Simple strategies for developing algorithms (iteration, recursion) - Efficiency of algorithms. (4)

ARRAYS AND STRING PROCESSING

Processing single dimension and multi-dimensional arrays. Manipulating an array. Arrays and matrices. Functions and Subroutines for iterations and recursive operations. (3)

ABSTRACT DATA TYPES

Stack – operations on stack, applications of stack. Queue – operations, circular queue representation. Applications of Queue. (4)

NON-LINEAR DATA STRUCTURES

Tree data structures – features, binary tree representation, search algorithms. Graphs representations and applications of graph. (4)

TOTAL: 15

REFERENCES

1. Richard F. Gilberg, Behrouz A. Forouzan, “Data Structures, A Pseudocode Approach with C”, 2nd Edition, Cengage Learning, 2007 .
2. Yashavant P. Kanetkar, “Data Structures through C”, 2nd Edition, BPB Publications, 2003.
3. Seymour Lipschutz, “Data Structures with C”, Schaum's Outline Series, 2nd Edition, McGraw Hill Publications, 2014.
4. Jeri R Hanly, Elliot B Koffman, “Problem Solving and Program Design in C”, Seventh Edition, Pearsons Publications, 2013.

23MCAB122 - PROGRAMMING IN C

L	T	P	C
1	0	0	0

PRE-REQUISITES

Consent of the Instructor

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Understanding the contiguous and non-contiguous memory allocation and usage

CO2 : Understanding recursive functions

CO3 : Understanding different types of memory allocation

CO4 : Understanding file management and Error handling mechanisms

ASSESSMENT : THEORY

ARRAYS AND POINTERS

Array manipulation: single, two and multi dimensional arrays. declaration, assignment and accessing using index values. Algorithms using arrays. Matrix operations, sort, search and applications using arrays. Pointers - Declaration. Accessing pointers. Pointers and Arrays. **(4)**

RECURSIVE FUNCTIONS

Recursive Function basic need for it. Declaration, Definition and Calling. Parameter passing - Local variables in recursive functions - Applications of recursive functions - Real time applications **(3)**

STRUCTURES, UNION AND ENUMERATION

Structure definition, declaration and using structures in programs. Pointers and structures. Structured arrays - creation and manipulation. Linked structures - Creation and manipulation. Applications of Linked Structures. Enumerations. **(4)**

FILE AND ERROR HANDLING

File concept - File opening in various modes and closing of a file - Reading from a file - Writing onto a file. Preprocessor: Conditional Compilation directives - Macros - Command Line Arguments.
(4)

TOTAL : 15

REFERENCES

1. Herbert Schildt, "C - The Complete Reference, McGraw Hill", 4th Edition, 2017.
2. R.G. Dromey, "How to solve it by Computer", Pearson Education, 5th Edition, 2007.
3. Kernighan B.W. and Ritchie D.M., "C Programming Language (ANSI C)", Paperback-1, Pearson Education, 2015.
4. Yashawant Kanetkar, "Let us C", BPB, 16th Edition, 2018.
5. Terrence W Pratt, "Programming language: Design and Implementation", Prentice Hall of India, 4th Edition, 2001.

23MCAB123 COMPUTER HARDWARE AND ORGANIZATION

L	T	P	C
1	0	0	0

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Identify and Solve the problems in the hardware of computer system

CO2 : Perform preventive maintenance and assemble the system.

CO3 : Interpret Modes of Data Transfer in the Input Output Peripherals.

CO4 : Determine the processing in the Multiprocessor and execute accordingly.

BASIC STRUCTURE OF COMPUTERS

Computer Types, Functional unit, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data Representation. Fixed Point Control memory, Address sequencing, microprogram example and control, Basic concepts semiconductor RAM memories. Read-only memory Computer Fundamentals. (3)

COMPUTER HARDWARE

Performing installation of operating system and other application, Usage of relevant tools and diagnostic techniques Configure Internet and Email, Perform routine, The software and Hardware parts, Preliminary information of hardware components. (3)

PREVENTIVE MAINTENANCE

Perform repairs to personal computers, The different types of Operating Systems and its importance, Complete information computer configuration activities, How to assemble the computer according customer requirements in a real environment, How to install computer Software, devices drivers as well as configuration of peripheral devices, How to configure internet (4)

INPUT-OUTPUT ORGANIZATION AND MULTIPROCESSORS

Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt Direct memory Access, Input -Output Processor (IOP) Serial communication; Introduction to peripheral component, Interconnect (PCI) bus. Introduction to standard serial communication protocols like RS232, USB, IEEE1394. Pipe line vector and multiprocessing Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors, Characteristics or Multiprocessors, Interconnection Structures, Interprocessor Arbitration. InterProcessor Communication and Synchronization

(5)

TOTAL : 15

REFERENCES

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky, “Computer Organization”, 5th Edition, McGraw Hill. 2016.
2. M.Moris Mano, “Computer Systems Architecture” 3rd Edition, Pearson PHI, 2017
3. Morris Rosenthal “The Laptop Repair Workbook: An Introduction to Troubleshooting and Repairing Laptop Computers”, 2nd Edition, PHI, 2016.
4. Jyotika Deshmukh, “A text book of Computer Hardware and Networking”, 4th edition, Prentice Hall, 2019.
5. Richand M. Roberts “Computer Service & Repair”, 4th Edition, PHI, 2019.

BRIDGE COURSES
SEMESTER 11

23MCAB221- FUNDAMENTALS OF INTERNET

L	T	P	C
1	0	0	0

PRE-REQUISITES
Consent of the Instructor

COURSE OUTCOMES
Upon completion of the course students will be able to
CO1 : Understand the basic concepts of the Internet.
CO2 : Understand the technologies behind the Internet.
CO3 : Understand the backend database connectivity.
CO4 : Understand the Security to be Implemented.

ASSESSMENT : THEORY

INTRODUCTION
Internet Today – The WWW – History – Resources – Architecture – Client / Server Technology – Accessing the Web: Browsers, its features, extension, plugins, Services by google to the web.

Internet And Resources: The network technology – Network Addresses – Protocols – URL – format – accessing the web. Resources: The Web pages, applications, database and attachments. MIME types. Applications:– Intermediaries – agents – monitors – resource identifiers – Data Exchange by commercial applications. (4)

TECHNOLOGIES
Static & Dynamic Page Development: HTML, DHTML, CSS, XML, - Versions and Standards – Scripting languages – Java Script – accessing the tags and web content using java script. Script Event Programming. Web Server – Accessing the Server – HTTP methods – Requests/Response. Server Page Development: JSP. Servlet Technologies. (4)

WEB BACKEND
Web database: XML, Structure – tags, attributes. XSD – Resource standards. Exchange data using XSD format. XSD and SOAP technologies. Connecting to databases on both client and Server Side. (4)

INTERNET SECURITY
FireWall – Setting up the firewall security, Data exchange security: Encryption/ Decryption standards. Threats and VIRUS. How to Save? Security Methods. (3)

TOTAL : 15 Hours

REFERENCES

1. Harvey Deitel, Abbey Deitel, “Internet and World Wide Web How To Program”, Fifth Edition, Pearson, 2012.
2. John R. Vacca, “Cyber Security and IT Infrastructure Protection”, Paperback, Elsevier Science, 2014.

23MCAB222 - SOFTWARE ENGINEERING

L	T	P	C
1	0	0	0

PRE-REQUISITES

Consent of the Instructor

ASSESSMENT: THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Choose applicable software life-cycle model to develop software for given customer need and justify choice with reference to complexity, cost and time.

CO2 : Determine software requirements based on customer need and develop industry standard Software Requirement Specification (SRS) document

CO3 : Understanding basic concepts of Design

CO4 : Understanding the Software Testing concepts which enables to develop a quality software.

INTRODUCTION TO SOFTWARE ENGINEERING

Software Engineering -Introduction - Software Process - Software Engineering Process - Generic Process Models (5)

REQUIREMENTS MODELING

Requirements Analysis

DESIGN CONCEPTS

Design Within the Context of Software Engineering - The Design Process - Design Concepts - The Design Model (5)

SOFTWARE TESTING

A Strategic Approach to Software Testing - Planning and Recordkeeping - Test-Case Design - White-Box Testing - Black-Box Testing - Object-Oriented Testing - Software Testing Fundamentals (5)

TOTAL : 15

REFERENCES

1. Roger S. Pressman, "Software Engineering - A Practitioner's approach", McGraw Hill International, 8th Edition, 2019.
2. Rajib Mall, "Fundamentals of Software Engineering", PHI. 5th Edition, 2018.
3. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa Publishing House, 3rd Edition, Reprint 2019.

23MCAB223 - PROGRAMMING IN C++

L	T	P	C
1	0	0	0

PRE-REQUISITES

23MCAB12

ASSESSMENT : THEORY

COURSE OUTCOMES

Upon completion of the course students will be able to

CO1 : Develop programs using fundamental concepts of C++.

CO2 : Design an object oriented software solution by discovering appropriate classes and objects and identifying attributes, behavior and hierarchy among the classes

CO3 : Apply the concepts of overloading and friend functions to develop software applications.

CO4 : Develop C++ programs by employing the object oriented constructs of inheritance and polymorphism for a given software requirement

BASIC FACILITIES IN C++

Overview of C++ - Types and Declarations - Arrays, Pointers, Structures, References and Functions - Function Overloading - Name spaces - Source Files and Programs. (4)

ABSTRACT DATA TYPE IN C++

Class - Class members and Access control - Constructors- Static members - Default copy constructor - this pointer - Inline function definition - Concrete classes - Destructors - new and delete. (4)

OPERATOR OVERLOADING

Operator Functions - Binary and Unary Operators - Member and Non Member Operators - Friend Functions - Function call - Increment and Decrement - A String class. (3)

INHERITANCE

Derived Classes - Class Hierarchies - Virtual Functions - Abstract classes – Runtime Polymorphism.. (4)

TOTAL : 15

REFERENCES

1. Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison Wesley, 2013.
2. Herbert Schildt, "The Complete Reference C++", 6th Edition, Tata McGraw Hill, 2013.

3. Stanley B Lippman, Jove Lajoie, and Barbara Moo, "C++ Primer", 5th Edition, Addison Wesley, 2012.