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122CAT01 APPLIED STATISTICS FOR DATA ANALYSIS

BASIC PREREQUISITES:

- Fundamental Mathematical Concepts
- Basic formula for statistics

COURSE OBJECTIVES :

- To learn the basic concepts of statistics like frequency distributions, graphical representations and curve fitting.
- To impart the knowledge of statistical measures of central tendency and dispersion.
- To introduce the notion of sampling distributions and acquire the knowledge of statistical techniques useful in decision making.
- To expose the statistical methods for analysis of variance and control limits.
- To study the statistical tools of data analysis such as Correlation, Regression, Principal Component analysis.

UNIT – I STATISTICAL DATA REPRESENTATIONS   9+3

Frequency distributions of data: cumulative and relative frequency distributions- Graphical representation of data – Pie charts, Bar graphs, Histogram, Frequency Polygon and Ogives.

UNIT - II QUANTITATIVE STASTICAL MEASURES   9+3

Measures of Central tendency: Arithmetic Mean, Median, Mode - Measures of Dispersion: Range, Quartile deviation, Standard deviation, Variance and Co-efficient of Variation.

UNIT – III TESTING OF HYPOTHESIS   9+3

Sampling distributions – Testing of hypothesis for large samples by Z-test and small samples by Student's t-test for single Mean, Proportion, equality of means and equality of proportions – F-test for single variance and equality of variances – Chi-square test for Goodness of fit and Independence of attributes.

UNIT - IV   DESIGN OF EXPERIMENTS   9+3

 ANOVA(Analysis of variance) – Completely Randomized Design(CRD-one way classification) – Randomised Block Design (RBD-two way classification) - Latin Square Design (LSD-Three way classification) - Control charts for measurements: mean chart or $\bar{x}$ - chart, R- chart.

UNIT - V DATA ANALYSIS   9+3

Correlation analysis : Karl Pearson's Coefficient of Correlation - Regression Analysis: Least Square fit of a Linear Regression -Two lines of Regression - Multivariate Analysis: Random vectors and matrices - mean vectors and covariance matrices – multivariate normal density function- Principal Component Analysis - Population Principal Components.

Total No. of Periods : 45 + 15

Note : *Use of approved statistical table is permitted in the examination.*

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Represent and interpret statistical data through bar graphs, pie graphs, histograms, frequency polygons and ogives.

CO2 : Calculate the measure of Central tendencies and Dispersion of the frequency distributions of data.

CO3 : Draw conclusions through hypothesis testing.

CO4 : Acquaint with the knowledge of analysis of variance for decision making and analyse the control limits of a sample.

CO5 : Apply statistical tools of data analysis such as Correlation, Regression, Principal Component analysis.

REFERENCES :

1. Gupta.S.C., & Kapoor,V.K., "Fundamentals of mathematical statistics", 11th edition, Sultan Chand & Sons publishers, New Delhi, 2013.

2. Levin R.I., Rubin S. David, "Statistics for Management", Eight edition, Pearson, 2017.
   [e-resource: Levin R.I., Rubin S. David, "Statistics for Management", Pearson, 2019].

3. Veerarajan.T., "Probability, Statistics and Random Processes", Tata McGraw-Hill publishing company Limited, New Delhi, 2014.

4. R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia , 8th edition, 2007.

5. Miller and Freund., "Probability and Statistics for Engineers", Pearson Education, Asia, 7th edition, 2012.

6. Arora.P.N. and Arora.S., "Statistics for Management", S.Chand & Company Ltd, 2009.

7. Keller, G, "Statistics for Management and Economics", Cengage Learning (Textbook/ eBook), 2019.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAT01 APPLIED STATISTICS FOR DATA ANALYSIS	CO1	3	3	2	2	-	-	-	3	3	2	-
	CO2	3	3	3	2	-	-	-	-	3	2	-
	CO3	3	3	3	3	-	-	2	2	3	1	2
	CO4	3	3	3	3	-	-	2	2	3	2	2
	CO5	3	3	3	3	-	2	2	2	2	2	3
Average		**3.00**	**3.00**	**2.80**	**2.60**	**-**	**2.00**	**2.00**	**2.25**	**2.80**	**1.80**	**2.33**

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122CAT02 PYTHON PROGRAMMING

BASIC PREREQUISITES:

- Basic Looping, branching statements and functions
- Fundamental of OOPs Concept
- Knowledge in Scripting Language

COURSE OBJECTIVES :

- To Develop python program using conditional and looping statement
- To implement python data structure – List, tuples, dictionary
- To process various file operations and exception handling.
- To define class and integrate database with python
- To execute modules, packages and framework.

UNIT – I INTRODUCTION   9

Introduction to Python Programming: Python Interpreter and Interactive Mode – Variables and Identifiers – Arithmetic Operators – Values and Types – Statement. Operators: – Boolean Values – Operator Precedence – Expression. Conditionals: If- Else Constructs – Loop / Structures / Iterative Statement – While Loop – For Loop – Break Statement – Continue Statement –Function Call and return values – Parameter Passing – Local and Global Scope – Recursive Function.

UNIT – II DATA TYPES   9

List and its Operation – Tuples – Dictionary – Sets – Advanced List Processing – List Comprehensive – Filtering – Modules: Module Loading Execution – Packages – Making your own Module – The Python Standard Libraries.

UNIT - III FILE HANDLING AND EXCEPTION HANDLING   9

Files – Introduction – File Path – Opening and Closing Files – Reading and Writing Files – File Position – Exception: Error and Exceptions – Exception Handling and Multiple Exceptions

UNIT – IV OOC AND DB INTEGRATION IN PYTHON   9

Introduction to OOC – Class and Methods – Encapsulation – Inheritance – Polymorphism – Class Methods Vs Static Methods – Python Object Persistence – Built-in Functions – Python and MySql Database Integration – Connect Database – Create and Insert Operation – Parameter Passing and Retrieving from the database.

UNIT – V MODULES, PACKAGES AND FRAMEWORKS   9

Modules – Introduction – Module Loading and Execution – Packages – Making your own Module – The Python Libraries for Data Processing, Data Mining and Visualization – NumPy- Pandas – Matplotlib – Frameworks – Django – Flask – Web2py

Total No. of Periods : 45

COURSE OUTCOMES:
At the end of course, the Student will be able to:

CO1 : Develop a solution to simple computation problem
CO2 : Analyze Compound Data Structure using python list, tuples and dictionaries.
CO3 : Design and Develop an application based on the File operation.
CO4 : Develop an application with Database Integrations
CO5 : Implement of an application with Modules, Packages and Frameworks

REFERENCES :

1. James Payne, "Beginning Python", Wrox Programming to Progammer, second editon 2018.
2. Fabrizio Romano,"Learn Python Programming", Second Edition, Paktr Publication, 2018
3. Ashok Namdev Kamthane, Amit Ashok Kamthane,"Python programming", McGrawHill Publication,2018
4. Brian Draper, "Python Programming -A Complete Guide for Beginners to Master and Become an Expert in Python Programming Language", Create Space Independent Publishing Platform,2016
5. John M. Stewart, "Python for Scientists", Cambridge University Press, 2015.
6. Mitch Garnaat, "Python and AWS Cookbook", First Edition, O'Reilly Media, Inc., 2012.
7. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist '', 2nd edition, Updated for Python 3, Shroff/O 'Reilly Publishers, 2016
8. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAT02 PYTHON PROGRAMMING	CO1	3	3	3	3	-	-	-	-	3	3	1
	CO2	3	3	3	3	-	-	-	-	3	3	-
	CO3	3	3	3	3	-	-	3	3	3	1	2
	CO4	3	3	3	3	-	-	2	3	3	3	2
	CO5	3	3	3	3	-	2	3	3	3	2	2
Average		3.00	3.00	3.00	3.00	0.00	2.00	2.67	3.00	3.00	2.40	1.75

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122CAT03 DATABASE MANAGEMENT SYSTEMS

BASIC PREREQUISITES:

- Basic database concept.

COURSE OBJECTIVES:

- Knowledge of DBMS, both in terms of use and implementation/design
- Understand the areas of database design, SQL and programming
- Understand relational and object oriented database technology for building applications for the current trend
- Evaluate a business situation and designing & building a database applications
- To understand the concept of file and indexing.

UNIT – I INTRODUCTION   9

File systems versus Database systems – Data Models – DBMS Architecture – Data Independence – Data Modeling using Entity – Relationship Model – Enhanced E-R Modeling.

UNIT – II RELATIONAL MODEL AND QUERY EVALUATION   9

Relational Model Concepts – Relational Algebra – SQL – Basic Queries – Complex SQL Queries – Joins -Views – Constraints – Partitions - Dynamic SQL, Other SQL Functions, overview of commercial RDBMSs – Database Design – Functional Dependencies – Normal Forms –1NF – 2NF-3NF-BCNF – 4NF-5NF - Algorithms for Executing Query Operations– Query Processing–Overview– Measures of Query Cost.

UNIT – III TRANSACTION PROCESSING   9

Transaction Processing – Properties of Transactions –Serializability– Transaction support in SQL – Time Stamp ordering – Recovery concepts – Shadow paging, Buffer Management – Log Based Recovery – Database Security Issues – Access control.

UNIT – IV FILES AND INDEXING   9

File Structures – Disks – RAID-File operations – Hashing Techniques – Indexing – Single level and Multi-level Indexes – B+ tree – Static Hashing - Indexes on Multiple Keys.

UNIT - V SPECIAL PURPOSE DATABASES   9

Basic Concepts: Distributed Databases DBMS Architecture, Architecture of Parallel Databases, Database design for ORDBMS - The ODMG Data Model and ODL

Total No. of Periods : 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Understand the basic fundamental of DBMS

CO2 : Analyze the principles of the relational model, develop and optimize SQL queries, and assess query execution.

CO3 : Apply and manage transaction processing, including transaction properties, serializability, recovery methods, and apply database security.

CO4 : Implement file structures, utilize disk storage and RAID, perform file operations.

CO5 : Design databases for object-relational systems using the ODMG data model and ODL.

REFERENCES

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan , "Database System Concepts", McGraw-Hill Education, 2019 ·

2. Ramez Elamassri and Shankant B-Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson Education Delhi, 2010.

3. Raghu Ramakrishnan, Johannes Gehrke ,' Database management systems", McGraw, Hill, 6rd Edition, 2014.

4. Frank. P. Coyle, "XML Web Services and the Data Revolution", Pearson Education, 2012.

5. Lee Chao, "Database Development and Management", Auerbach Publications, 2016.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAT03 DATABASE MANAGEMENT SYSTEMS	CO1	3	3	3	3	2	-	-	3	3	3	3
	CO2	3	3	3	3	2	-	-	-	3	3	-
	CO3	3	3	3	3	1	2	3	3	3	3	-
	CO4	3	3	3	3	1	1	3	1	3	3	-
	CO5	3	3	3	3	3	-	-	2	3	3	-
Average		3.00	3.00	3.00	3.00	1.80	1.50	3.00	2.25	3.00	3.00	3.00

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122CAT04 DATA STRUCTURES AND ALGORITHMS

BASIC PREREQUISITES:

- Knowledge in C Structure
- Understanding of Pointers
- Concept in Array and Linked List.

COURSE OBJECTIVES :

- To Understand the Basic Linear Data Structures
- To Learn and use Non Linear Data Structures
- To gain the knowledge of Sorting and Searching techniques
- To understand the fundamental concepts of Graphs.
- To design and analysis of algorithm.

UNIT - I LINEAR DATA STRUCTURES   9

Introduction – Abstract Data Types- Array and its Representation – Stack ADT – Application of Stack – Queue ADT- Application of Queue – Linked List – Doubly Linked List – Circular Linked List – Application of Linked List.

UNIT – II NON LINEAR DATA STRUCTURES   9

Tree and its Representation – Binary Tree – Search Tree ADT- Binary Search Trees – Huffman's Algorithm – AVL Tree – Threaded Binary Tree – Splay Tree – B-Tree.

UNIT - III SORTING AND SEARCHING   9

Sorting – Internal Sorting – Bubble Sort - Quick Sort – Insertion Sort - Heap Sort - External Sorting – Merge Sort – Multi-way Sort – Basic Searching Techniques – Tree Searching and Hashing.

UNIT - IV GRAPHS   9

Graphs – Representation of Graphs – Graph Traversal – Depth First Traversal – Breadth First Traversal – Shortest Path Algorithm – Minimum Spanning Tree – Prims and Kruskal's Algorithms.

UNIT - V ALGORITHM DESIGN AND ANALYSIS   9

Algorithm Analysis – Asymptotic Notations – Divide and Conquer Technique – Greedy Algorithms – Knapsack Problem – Dynamic Programming – Warshall Algorithm – Backtracking – Sum of Subset Problem.

Total No. of Periods : 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Utilize abstract data types including arrays, stacks, queues, and linked lists effectively in practical applications.

CO2 : Analyze binary search trees and apply Huffman's algorithm for optimal coding.

CO3 : Develop proficiency in sorting algorithms, basic searching techniques, tree-based searching, and hashing methods

CO4 : Implement graph theory concepts to solve real-world problems, demonstrating proficiency in algorithmic design and optimization within various computational scenarios.

CO5 : Apply divide and conquer, greedy algorithms, dynamic programming, and backtracking techniques to solve complex computational problems.

REFERENCE BOOKS :

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education Asia, 2013.
2. Tanaenbaum A.S.,Langram Y. Augestein M.J " Data Structures using C" Pearson Education , 2004.
3. Anany Levitin "Introduction to the Design and Analysis of Algorithms" PearsonEducation 2003.E. Horowitz, S.Sahni and Dinesh Mehta, "Fundamentals of Data structures in C++",University Press, 2007.
4. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", Second Edition,University Press, 2007.
5. Reema Thareja, "Data Structures using C", Oxford Press, 2012.
6. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, 1983.
7. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", Second Edition.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAT04 DATA STRUCTURES AND ALGORITHMS	CO1	3	3	3	3	2				3	3	
	CO2	3	3	3	3	2				3	3	
	CO3	3	3	3	3	2	2	3	3	3	3	2
	CO4	3	3	3	3	2		2	2	3	3	2
	CO5	3	3	3	3	2		3	2	3	3	3
Average		3.00	3.00	3.00	3.00	2.00	2.00	2.67	2.33	3.00	3.00	2.33

122CAT05 RESEARCH METHODOLOGY

BASIC PREREQUISITES:
- Idea about Data Collections
- Meaning of Hypothesis
- Preparation of Report Writing

COURSE OBJECTIVES :
- To Understand the Basic Good Research
- Learn to design the research.
- To gain the knowledge of Measurement and methods for data collections
- To Understand the Hypothesis Standard.
- To design and analysis of Interpretation and report writing.

UNIT - I INTRODUCTION   9

Meaning of Research- Objective of Research – Motivation of Research – Types of Research – Research Approaches – Significance of Research – Research Methods Vs Research Methodology – Research Process – Criteria of Good Research – Research Problem – Selecting the problem – The Techniques involved in defining the problem.

UNIT - II RESEARCH DESIGN   9

Meaning of Research Design – Need for Research Design – Features of Good Design – Different Research Design – Basic Principles of Experimental Design – Census and Sample Survey – Implications of a Sample Design – Steps in Sampling Design – Criteria of Selecting a sample procedure – Characteristics of Good Sample Design – Different types of Sample Design.

UNIT – III MEASUREMENT AND METHODS FOR DATA COLLECTIONS   9

Measurement in Research – Scales – Error Measurement – Types of Measurement – Techniques of Developing Measurement tools – Scaling – Meaning of Scaling –Scale Classification bases – Scaling Techniques – Collection of Primary Data – Observation –Interview Method – Collection of Data Through Questionnaires – Data Through Schedules – Difference between Questionnaires and Schedules.

UNIT – IV HYPOTHESIS STANDARD   9

Hypothesis – Basic Concepts – Procedure – Flow Diagram – Tests of Hypotheses – Parametric Test – Hypothesis Testing: Means – Difference between means – Comparing two related samples – proportions – difference between proportions – Comparing a variance –Correlation Coefficients – Limitation of the Tests of Hypothesis.

UNIT – V INTERPRETATION AND REPORT WRITING   9

Meaning of Interpretations – Technique of Interpretation – Precaution in Interpretation – Significance of Report Writing – Different Steps in Writing Report – Layout of the Research Report – Types of Reports – Oral Presentation – Mechanics of Writing a Research Report – Precautions for Writing Research Reports.

Total No. of Periods : 45

COURSE OUTCOMES:
At the end of course, the Student will be able to:

CO1 : Grasp the essentials of research, encompassing objective setting, motivations, types, and approaches.

CO2 : Navigate the selection and implementation of effective research designs, equipping themselves to conduct rigorous and influential research across diverse academic.

CO3 : Develop proficiency in creating measurement tools and scaling techniques, effectively classifying scales based on their properties

CO4 : Proficient in hypothesis formulation, testing procedures, and flow diagrams.

CO5 : Analyze research data and effectively communicate findings through well-written reports and presentations

REFERENCE BOOKS :

1. C.R. Kothari, "Research Methodology Methods and Techniques", A New Age International Publishers, Second Edition, 2004

2. Dr. Shanthi Busan Misra, Dr. Shashi Alok, "Hand Book of Research Methodology A Compendium for Scholars and Researchers' Educreation, 2011.

3. R. Paneerselvam, "Research Methodology", Second Edition, PHI Learning Private Limited, 2014.

4. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 11e 2012.

5. Ranjith Kumar, "Research Methodology a Step by Step Guide for Beginner", Third Edition, SAGE Publication, 2014.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAT05 RESEARCH METHODOLOGY	CO1	1	3	3	2	-	-	-	-	2	-	-
	CO2	2	3	3	3	-	-	-	-	2	-	-
	CO3	3	3	3	3	-	3	3	3	3	2	3
	CO4	3	3	3	2	-	-	2	-	3	2	2
	CO5	-	-	-	3	-	-	2	3	-	3	-
Average		2.25	3.00	3.00	2.60	-	3.00	2.33	3.00	2.50	2.33	2.50

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122CAP01 DATABASE MANAGEMENT SYSTEMS LAB

BASIC PREREQUISITES:
- Fundamental of Database Concept.

COURSE OBJECTIVES :
- To understand the concepts of DBMS.
- Populate and query a database using SQL DDL/DML Commands
- Declare and enforce integrity constraints on a database
- Writing Queries using advanced concepts of SQL
- Programming PL/SQL including procedures, functions, cursors and triggers

LIST OF EXPERIMENTS

1. Execute all DDL, DML and DCL commands on sample tables.
2. Implementation of different types of operators and built-in functions with suitable examples
3. Implementation of different types of joins with suitable examples
4. Create views, partitions, Sequence, Indexes and locks
5. Implement different types of constraints on relations.
6. Implementation of sub queries and nested queries.
7. Implement Queries on Group By & Having Clauses, ALIAS, Sequence By, Order By
8. a) Write a PL/SQL block for IF, IF and else condition
   b) Write a PL/SQL block for implementation of loops
   c) Write a PL/SQL block for greatest of three numbers using IF ANDELSEIF
9. Exception Handling-Implement the following with respect to exception handling.
   a) Raising Exceptions
   b) User Defined Exceptions
   c) Pre-Defined Exceptions
10. Write PL/SQL block for an application using exception handling Procedures
    a) Write a PL/SQL Procedure using Positional Parameters
    b) Write a PL/SQL Procedure using notational parameters
    c) Write a PL/SQL Procedure for GCD Numbers
    d) Write a PL/SQL Procedures for cursor implementation (explicit and implicit cursors)
11. Functions:
    a) Write a PL/SQL block to implement factorial using functions
    b) Write a PL/SQL function to search an address from the given database
12. Write a DBMS program to prepare Pl/SQL reports for an application using functions.
    a) Write a Trigger to pop-up the DML operations
    b) Write a Trigger to check the age valid or not Using Message Alert.
    c) Create a Trigger to Raise appropriate error code and error message.
    d) Create a Trigger on a table so that it will update another table while inserting values
13. Write PL/SQL block for an application using cursors and all types of triggers.
14. Write a PL/SQL block for transaction operations of a typical application using package

Total No. of Periods : 60

COURSE OUTCOMES :

At the end of course, the Student will be able to:

CO1 : Execute DDL, DML, and DCL commands, use different operators and built-in functions, and implement various types of joins on sample tables

CO2 : Implement a variety of constraints on relations for data integrity and proficiency in using subqueries and nested queries.

CO3 : Develop robust PL/SQL blocks, incorporating conditional statements, loops, and exception handling mechanisms

CO4 : Master PL/SQL programming, including procedures with positional and notational parameters, functions for complex computations and database queries

CO5 : Implement PL/SQL blocks using advanced cursor techniques for precise data management and leverage diverse triggers to automate

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAP01 DATABASE MANAGEMENT SYSTEMS LAB	CO1	3	3	3	3	-	-	-	-	3	-	-
	CO2	3	3	3	3	-	-	-	2	3	-	-
	CO3	3	3	3	3	2	-	3	3	3	3	2
	CO4	3	3	3	3	2	2	2	3	3	3	2
	CO5	3	3	3	3	2	-	1	3	3	3	3
Average		3.00	3.00	3.00	3.00	2.00	2.00	2.00	2.75	3.00	3.00	2.33

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122CAE01 SOFTWARE ENGINEERING

BASIC PREREQUISITES:

- Basic Definition of Software Engineering
- Functionalities of Software Engineering

COURSE OBJECTIVES :

- To provide an insight into the processes and models of software development.
- To understand the problem domain for developing SRS and various models of Software Engineering.
- To model Software Projects into high level design using DFD, UML diagrams
- To analyze and evaluate the user interface design
- To measure Quality and to categorize testing methods.

UNIT - I SOFTWARE PROCESS   9

Introduction-Nature of Software-Software Engineering- Importance of Software Engineering-Software Engineering Life Cycle-Software Process-Software Myths, Generic Process Model-Prescriptive Process model: The Waterfall-Incremental-Evolutionary-Concurrent Models-Specialized Process Models-Component based developments-Formal Methods Model-Aspect Oriented Software Development-The Unified Process-Agile Software Development Model.

UNIT - II SOFTWARE REQUIREMENTS   9

Requirements Engineering: Establishing the Groundwork-Requirements Elicitation-Building the Requirements Model-Negotiating and Validating Requirements-Requirement Analysis-Scenario Based Modeling-Data Modeling Concepts-Class based Modeling-Requirement Modeling Strategies-Flow Oriented Modeling-Creating a Behavioural Model-Patterns for Requirement Modeling.

UNIT - III DESIGN CONCEPTS AND ARCHITECTURE   9

Design Process-Design Concepts and Design Models. Architectural Design: Software Architecture-Architecture Genres-Architectural Styles-Architectural Patterns-Architectural Design-Defining Archetypes-Refining Architecture into Components-Assessing Alternative Architectural Design-Architectural Mapping using dataflow.

UNIT - IV COMPONENT-LEVEL AND USER INTERFACE DESIGN   9

Component-Level Design: Definition of Component-Designing Class Based Components-Conducting Component Level Design-User Interface Design: The Golden Rules-User Interface Analysis and Design. Interface Analysis-Interface Design Steps-Design Evaluation-Pattern Based Design-Design Patterns-User Interface Design Patterns.

UNIT - V SOFTWARE QUALITY AND SOFTWARE TESTING   9

Software Quality- Achieving Software Quality- Quality Control-Quality Assurance-Software Testing-Importance of Software Testing- Software Testing Strategies-A Strategic Approach to Software Testing-Test Strategic for Conventional Software-Unit Testing-Integration Testing-Validation Testing-System Testing- White box Testing-Basis Path Testing-Control Structure Testing-Black box Testing- Case Study – Testing Tool – Eclipse IDE – Selenium IDE.

Total No. of Periods : 60

COURSE OUTCOMES :

At the end of course, the Student will be able to:

CO1 : Understand and apply fundamental software engineering principles and methodologies to design, develop, and maintain high-quality software systems.

CO2 : Effectively gather, analyze, model, and validate software requirements to ensure the development of accurate, reliable, and user-centric software systems.

CO3 : Apply fundamental design concepts and models to create robust software architectures, utilizing architectural styles and patterns

CO4 : Design and evaluate software components, user interfaces using best practices and design patterns

CO5 : Implement software quality assurance and testing strategies to ensure the delivery of high-quality software systems

REFERENCES

1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach, Tata McGraw-Hill Education, 8th Edition, 2015
2. Watts S. Humphrey, "A Discipline for Software Engineering", Pearson Education, Edition 2007.
3. James F Peters and Witold Pedrycz," Software Engineering-An Engineering Approach: John Wiley and Sons, New Delhi, 2009.
4. Shari Lawrence Pfleeger, Joanne M. Atlee, "Software Engineering: Theory and Practice", Fourth Edition, Pearson Education, 2010.
5. Ian Sommerville, "Software Engineering", Ninth Edition, Pearson Education, 2011

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAE01 SOFTWARE ENGINEERING	CO1	2	3	3	2	2	3	-	-	3	1	-
	CO2	2	3	2	2	2	3	2	-	3	1	-
	CO3	2	3	3	3	-	3	2	2	3	1	1
	CO4	2	2	3	3	-	2	2	2	3	1	1
	CO5	2	2	2	3	-	3	2	2	3	1	1
Average		2.00	2.60	2.60	2.60	2.00	2.80	2.00	2.00	3.00	1.00	1.00

122CAE02 COMPUTER NETWORKS

BASIC PREREQUISITES:

- Knowledge of Types of Networks
- Functionalities of Various Topology
- Process of Packets

COURSE OBJECTIVES :

- To learn the fundamental concept of OSI Layer, Networks and Protocol standards.
- To understand about Wired and Wireless Network in Data Link Layer
- To Explore the concept of Network Protocol and Routing
- To Know the basic concept of Transport Layer
- To understand basic skill in Application Layer.

UNIT - I DATA COMMUNICATION 9

Data Communication – Networks - Protocols and Standards – Network Models – Layers in the OSI model – TCP/IP Protocol Suite – Addressing – Transmission Modes – Transmission Media Telephone Network – Dial-Up Modems – Digital Subscriber Line – Cable TV Networks – Cable TV for Data Transfer.

UNIT - II DATA LINK LAYER 9

Error Detection and Error Correction : Block Coding – Linear Block Codes – Cyclic Codes – Checksum – Data Link Control : Framing – Flow and error control – Protocols – Noiseless channels – Noisy channels – HDLC – Point to point protocols – Wired LANs: Ethernet – IEEE standard - Standard Ethernet – Changes in the standard – Fast Ethernet – Gigabit Ethernet – Wireless LANs: IEEE 802.11 – Bluetooth – SONETISDH – Architecture – SONET layers – SONET frames – STS Multiplexing – SONET networks – Virtual Tributaries.

UNIT - III NETWORK LAYER 9

Internetworking – Ipv4 Addresses – Ipv6 Addresses -Ipv4 – Ipv6 – Transition from IPv4 to IPv6 – Address Mapping –ICMP – IGMP – ICMPv6 – Delivery- Forwarding – Routing – Unicast Routing protocols – Multicast Routing protocols

UNIT - IV TRANSPORT LAYER 9

Process-to-Process Delivery – User Datagram Protocol – TCP – SCTP – Data Traffic – Congestion and its Control – Quality of Service – Improve QoS – Integrated Services – QoS in Switched Networks.

UNIT - V APPLICATION LAYER 9

Domain Name System – Remote Logging – Electronic Mail – File Transfer – WWW and HTTP – Simple Network Management Protocol – Cryptography – Symmetric-Key and Asymmetric-Key Cryptography – Security Service – Message Confidentiality, Integrity and Authentication – IPSec – SSL – PGP – Firewall.

Total Number of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1. Understand principles of data communication, network protocols, and standards, including the OSI and TCP/IP models, various transmission modes, media, and modern telecommunication technologies

CO2. Implement data link layer mechanisms such as framing, flow control, and error control.

CO3. Analyze and evaluate different routing algorithms and their impact on network performance.

CO4. Applying knowledge of transport layer protocols in practical network applications and optimizing their performance.

CO5. Demonstrate proficiency in understanding, configuring, and securing network services.

REFERENCES :

1. Gerry Howser, "Computer Networks and the Internet: A Hands-On Approach", Springer Publication, 2019
2. Oliver C. Ibe, "Fundamentals of Data Communication Networks", Wiley Publication, 2017
3. Behrouz A. Forouzan, "Data Communication and Networking", 4th Edition, McGraw-Hill, 2007.
4. Behrouz A. Forouzan and Firouz Mosharraf, "Computer Networking: A Top-Down Approach", McGraw-Hill, 2013.
5. Andrew S. Tannenbaum and David J. Wetherall, "Computer Networks", Pearson, 2013.
6. William Stallings, "Data and Computer Communications", 8th Edition, Pearson, 2012.
7. Larry L. Peterson & Bruce S. Davie, "Computer Networks – A systems Approach", 5th Edition, 2012.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAE02 COMPUTER NETWORKS	CO1	2	3	3	2	-	-	-	-	3	-	-
	CO2	2	3	2	2	-	-	2	-	3	-	-
	CO3	2	3	3	3	-	3	2	2	3	2	2
	CO4	2	2	3	3	-	-	1	2	3	2	2
	CO5	2	2	2	3	-	-	2	2	3	2	2
Average		2.00	2.60	2.60	2.60	0.00	3.00	1.75	2.00	3.00	2.00	2.00

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122CAE03 PROBLEM SOLVING TECHNIQUES

BASIC PREREQUISITES:

- Definition of Problem Understanding.
- Objectives and Goal of Feasible Solutions
- Determination of various Optimal Solutions.

COURSE OBJECTIVES:

- To Understand the Basic Computer Problem Solving
- To Learn and use Factoring Methods
- To gain the knowledge of Array Techniques
- To Understand the fundamental concepts of Text Processing and Pattern Searching
- To design and analysis of dynamic data structures algorithm.

UNIT - I INTRODUCTION TO COMPUTER PROBLEM SOLVING   9

The Problem –Solving Aspect- Top-Down Design – Implementation of Algorithms – Program Verification – The Efficiency of Algorithms – The Analysis of Algorithms – Exchanging the value of two variables – Counting – Summation of a Set of Numbers – Factorial Computation – Sine Function Computation – Generation of Fibonacci Series – Reversing the Digit of an Integer – Base Conversion – Character to Number Conversion.

UNIT - II FACTORING METHODS   9

Introduction – Finding the square root of a Number – The Smallest Divisor of an Integer – The Greatest Common Divisor of Two Integers – Generating Prime Numbers- Computing the Prime Factors of an Integer – Generation of Pseudo –random numbers – Raising a Number to a Large Power – Computing nth Fibonacci number.

UNIT – III ARRAY TECHNIQUES   9

Introduction – Array Order Reversal – Array Counting or Histogramming - Finding the Maximum Number in a Set – Removal of Duplicates from an Ordered Array – Partitioning an Array – Finding the Kth Smallest Elements – Longest Monotone Subsequence.

UNIT - IV TEXT PROCESSING AND PATTERN SEARCHING   9

Introduction – Text Line Length Adjustment – Left and Right Justification of Text – Keyword Searching in Text – Text Line Editing – Linear Pattern Search – Sublinear Pattern Search.

UNIT – V DYNAMIC DATA STRUCTURES ALGORITHMS   9

Stack Operation – Queue Addition and Deletion – Linked List – Binary Tree Traversal – Recursive Quicksort – Towers of Hanoi Problem – Sample Generation – Combination Generation – Permutation Generation.

Total No. of Periods : 45

COURSE OUTCOMES :

At the end of course, the Student will be able to:

CO1 : Demonstrate proficiency in problem-solving, algorithm design, and analysis techniques to develop efficient and reliable computer programs.

CO2 : Analyze fundamental algorithms and computational methods in number theory to solve mathematical problems efficiently and accurately.

CO3 : Apply advanced algorithms and data structures to manipulate and analyze arrays efficiently, solving complex computational problems in diverse application domains.

CO4 : Implement algorithms to perform various operations such as text processing and pattern searching

CO5 : Solve a wide range of computational problems across different disciplines and applications.

REFERENCE BOOKS :

1. David a Freitag,"Programming and Problem Solving an Introduction to Computer Science", Independently Published, 2019
2. Maureen Sprankle, Jim Hubbard, "Problem Solving & Programming Concepts", PearsonEducation Limited,2014
3. R.G.Dromey, "How to solve it by Computer", Pearson Education, India, 2009.
4. J.R.Hanly and E.B.Koffman, "Problem Solving and Program Design in C", 5th Edition 2009, Pearson Education.
5. Maureen Sprankle," Problem Solving and Programming Concepts", 7th Edition, Pearson Education 2008.
6. Robert L. Segesta," Concepts of Programming Languages", 10th Ed. Pearson Education, 2012.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAE03 PROBLEM SOLVING TECHNIQUES	CO1	3	3	3	3	2	-	-	2	3	2	-
	CO2	3	3	3	3	2	-	1	2	3	2	-
	CO3	3	3	3	3	1	1	1	1	3	2	-
	CO4	3	3	3	3	1	1	1	1	3	2	1
	CO5	3	3	3	3	1	2	1	3	3	2	1
Average		3.00	3.00	3.00	3.00	1.40	1.30	1.00	2.25	3.00	2.00	1.00

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122CAE04 DIGITAL FUNDAMENTAL AND COMPUTER ORGANIZATION

BASIC PREREQUISITES:

- Basic Logic Gate
- Fundamental of Number Systems
- Process of Flip Flop

COURSE OBJECTIVES :

- To understand the fundamental knowledge about design of digital systems.
- To learn logical operation of digital components and register transfer language.
- To organize and design the basic digital computers.
- To Understand the basic programming and I/O organization
- To Practice knowledge about Memory Organization.

UNIT – I DIGITAL LOGIC CIRCUIT   9

Digital Computers – Logic Gates – Boolean Algebra – Map Simplification – Combinational Circuits: Half –Adder – Full Adder – Flip-Flops: SR Flip-Flop – D Flip –Flop- JK Flip Flop- T-Flip Flop – Sequential Circuit.

UNIT – II DIGITAL COMPONENTS, REGISTER AND MICROOPERATIONS   9

Integrated Circuit – Decoders- Multiplexers- Registers – Shift Registers – Binary Counters – Memory Unit – Register Transfer Language- Bus and Memory Transfer – Arithmetic Micro operations – Logic Micro operations – Shift Micro operations – Arithmetic Logic Shift Unit – Hardware Description Languages.

UNIT III - BASIC COMPUTER ORGANIZATION AND DESIGN   9

Instruction Codes – Computer Registers – Computer Instructions- Timing and Control – Instruction Cycle – Memory- Reference Instructions- Input –output and Interrupt – Complete Computer Description – Design of Basic Computer – Design of Accumulator Logic-.

UNIT IV – BASIC PROGRAMMING AND I/O ORGANIZATION   9

Machine Language – Assembly Language – The Assembler – Program Loops- Subroutines – Input and output programming -. Peripheral Devices – I/O Interface – Asynchronous Data Transfer- Modes of Transfer – Priority Interrupt – Direct Memory Access- I/O Processor – Serial Communications.

UNIT V - MEMORY ORGANIZATION   9

Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory –Memory Management Hardware.

Total No. of Periods : 45

COURSE OUTCOMES :

At the end of course, the Student will be able to:
   CO1 : Design and build basic combinational circuits like adders, grasp the operation of flip-flops and sequential circuits
   CO2 : Develop skills in using decoders, multiplexers, and designing efficient memory units and counters.
   CO3 : Design and evaluate basic computer systems and their components.
   CO4 : Master programming in machine and assembly languages, with proficiency in writing efficient loops and subroutines.
   CO5 : Apply knowledge of memory management techniques to optimize computer system performance.

REFERENCE BOOKS :

1. M. Morris Mano, "Computer System Architecture", Third Edition, Pearson Education,2013.
2. Ata Elahi," Computer Systems-Digital Design, Fundamentals of Computer Architecture and Assembly language", Springer Publication, 2017.
3. Joseph D. Dumas, "Computer Architecture –Fundamentals and Principles of Computer Design", CRC Press Publication, 2016
4. Ashok Arora, "Computer Fundamental and Applications", Vikas Publication, 2015.
5. Nikrouz Faroughi, Digital Logic Design and Computer Organization with Computer Architecture for Security, McGraw-Hill Education,2014
6. Sarah Harris, David Harris, Digital Design and Computer Architecture ARM Edition, Elsevier Science, 2015.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAE04 DIGITAL FUNDAMENTAL AND COMPUTER ORGANIZATION	CO1	3	3	3	2	1	-	-	1	3	2	-
	CO2	3	3	3	1	1	-	-	1	3	2	-
	CO3	2	3	3	2	1	-	-	2	3	2	-
	CO4	3	3	3	3	1	-	-	1	3	2	-
	CO5	2	3	3	3	1	-	-	1	3	2	-
Average		2.60	3.00	3.00	2.20	1.00	-	-	1.20	3.00	2.00	-

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122CAE05 ARTIFICIAL INTELLIGENCE

BASIC PREREQUISITES:

- Definition of Artificial intelligence
- Types of Artificial Intelligence and its functionalities

COURSE OBJECTIVES :

- To provide a fundamental concept in Artificial Intelligence.
- To learn how to represent knowledge in solving AI problems
- To apply various techniques in application which involve reasoning.
- To analyze about Natural Language Processing,
- To Explore knowledge about AI applications and Model.

UNIT - I INTRODUCTION 9

Artificial Intelligence Definition-Goal of Artificial Intelligence-AI technique- Progress of AI - Uninformed Search -General State space search- Depth First Search-Depth Limited Search-Iterative Deepening Search-Breadth First Search-Uniform Cost Search-Informed Search-Heuristic Search Techniques-Generate and Test-Best First Search-Hill Climbing

UNIT - II KNOWLEDGE REPRESENTATION 9

Knowledge Representation-Representation and Mappings-Approaches to Knowledge Representation-Propositional Calculus- Predicate Calculus-Clausal Form-Inference Rules-Unification Algorithm-Resolution

UNIT – III SYMBOLIC REASONING UNDER UNCERTAINTY AND STATISTICAL REASONING 9

Non monotonic Reasoning-Bayes Theorem-Certainty Factors-Bayesian Networks-Dempster-Shaffer Theory-Fuzzy Logic—Semantic Nets-Frames-Conceptual Dependency-Scripts-CYC-Game Playing

UNIT - IV NATURAL LANGUAGE PROCESSING, PARALLEL AND DISTRIBUTED ARTIFICIAL INTELLIGENCE 9

Introduction-Syntactic Processing-Semantic Analysis-Discourse and Pragmatic Processing-Stochastic Tools for Language Analysis-Natural Language Applications-Psychological Modeling-Parallelism in Reasoning Systems-Distributed Reasoning Systems-PROLOG

UNIT - V APPLICATIONS 9

AI Applications – Language Models – Information Retrieval – Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

Total No. of Periods : 45

COURSE OUTCOMES :

At the end of course, the Student will be able to:

CO1 : Develop proficiency in both traditional and heuristic-based search algorithms.

CO2 : Acquire in-depth knowledge of knowledge representation methods like Propositional and Predicate Calculus, and their application in logical reasoning

CO3 : Master symbolic reasoning techniques in uncertain environments, including Bayesian Networks and Fuzzy Logic.

CO4 : Develop Natural Language Processing (NLP) techniques, including syntactic and semantic analysis, discourse processing, and pragmatic interpretation.

CO5 : Apply AI techniques across various multi-disciplinary domains.

REFERENCES

1. Elaine Rich and Kevin Knight S.B. Nair, "Artificial Intelligence" Tata McGraw-Hill Pub, Delhi, 2009.
2. M. Tim Jones, "Artificial Intelligence" A systems Approach, Firewall Media, Edition 2010.
3. George F Luger, "Artificial Intelligence, structures and strategies for complex problem solving", Pearson Education, Delhi, Edition 2001
4. Sharbani Bhattacharya," Artificial Intelligence", University Science Press, New Delhi, 2008.
5. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2009.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAE05 ARTIFICIAL INTELLIGENCE	CO1	3	3	3	3	2	2	1	3	3	2	-
	CO2	3	3	3	3	1	1	1	1	3	1	-
	CO3	3	3	3	3	1	-	-	1	3	2	-
	CO4	3	3	3	3	1	-	-	1	3	2	1
	CO5	3	3	3	3	1	-	-	1	3	2	1
Average		3.00	3.00	3.00	3.00	1.20	1.50	1.00	1.40	3.00	2.00	1.00

122CAL01 DATA STRUCTURES AND ALGORITHMS LAB

BASIC PREREQUISITES:

- Knowledge of Structure in C
- Understanding of Pointers in C
- Concept in Array and Linked List.

COURSE OBJECTIVES :

- To understand the basic operation of linear data structures.
- To learn the concept of non-linear data structures
- To analyse the various sorting techniques.
- To understand the shortest path algorithm.
- To analyse and design various algorithm and techniques.

LIST OF EXPERIMENTS

1. Implement Stack and Queue Operation using Array.

2. Implement Single and Doubly Linked list.

3. Create a Binary Search Tree with traversal.

4. Implement the operation of Binary Search Tree.

5. Sort the given list of numbers using quick sort.

6. Develop program to sort the number using merge sort.

7. Perform Breadth First search in a given graph.

8. Find the Shortest Path Algorithm using Dijkstra Algorithms.

9. Perform Knapsack problem using greedy algorithm

10. Perform Sum of Sub Set Problem using Branch and Bound Method.

Total No. of Periods : 60

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Design and implement algorithms using linear data structures to solve computational problems.

CO2 : Develop competencies in using BSTs to manage data effectively and solve algorithmic challenges.

CO3 : Apply appropriate sorting techniques based on problem constraints and data characteristics.

CO4 : Implement Algorithm to determine the shortest path in weighted graphs.

CO5 : Apply greedy algorithms to solve the Knapsack problem efficiently and utilize the Branch and Bound method

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAL01 DATA STRUCTURES AND ALGORITHMS LAB	CO1	3	3	3	3	-	-	-	-	3	-	-
	CO2	3	3	3	3	-	-	-	-	3	-	-
	CO3	3	3	3	3	-	-	3	2	3	3	2
	CO4	3	3	3	3	2	2	3	2	3	3	3
	CO5	3	3	3	3	2	1	2	3	3	3	3
Average		3.00	3.00	3.00	3.00	2.00	1.50	2.67	2.33	3.00	3.00	2.67

122CAL02 NETWORK PROGRAMMING LAB

BASIC PREREQUISITES:
- Basic Linux Command
- Concept of Protocols like TCP/IP, UDP
- Structure of Packets.

COURSE OBJECTIVES :
- Understands the fundamental concepts of computer networking and OSI Reference model.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Learn and understand the advanced networking concepts, preparing the student for entry advanced courses in computer networking.
- Develop and gain expertise in some specific areas of networking such as the design and maintenance of individual networks.
- To study about Client-Server models, Processes, Semaphores and their programming.

LIST OF EXPERIMENTS

1. Implement the following forms of IPC.
   a) Pipes
   b) FIFO
2. Implement file transfer using Message Queue form of IPC
3. Write a programme to Create an integer variable using shared memory concept and increment the variable
4. Simultaneously by two Processes. Use Semaphores to avoid race conditions
5. Design TCP iterative Client and Server application to reverse the given input sentence
6. Design TCP Client and Server application to transfer file
7. Design a TCP concurrent Server to convert a given text into uppercase using Multiplexing system call "select"
8. Design a TCP concurrent Server to echo given set of sentences using poll functions
9. Design UDP Client and Server application to reverse the given input sentence.
10. Design UDP Client server to transfer a file
11. Design using poll Client-Server application to multiplex TCP and UDP requests for converting a given text into upper case.
12. Design a RPC application to add and subtract a given pair of integers.

Total No. of Periods : 60

COURSE OUTCOMES :

At the end of course, the Student will be able to:

CO1 : Demonstrate proficiency in implementing Pipes and FIFOs for inter-process communication (IPC)

CO2 : Learn to manage shared memory variables among multiple processes and implement semaphores to ensure synchronized access.

CO3 : Design TCP client-server applications for tasks like text manipulation, file transfer, and concurrent server operations using advanced network programming techniques.

CO4 : Design and implement a UDP Client-Server application

CO5 : Develop network security and define various protocols such as FTP, HTTP, Telnet, DNS

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAL02 NETWORK PROGRAMMING LAB	CO1	3	3	2	2	1	-	1	1	3	2	-
	CO2	3	3	2	2	1	-	1	2	3	1	-
	CO3	3	3	2	2	1	-	1	2	3	1	-
	CO4	3	3	3	3	1	-	1	1	3	1	-
	CO5	3	3	3	3	1	-	1	1	3	2	1
Average		3.00	3.00	2.40	2.40	1.00	-	1.00	1.40	3.00	1.40	1.00

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122CAL03 APPLIED STATISTICS FOR DATA ANALYSIS LAB

BASIC PREREQUISITES:

- Basic Statistics formula
- Predefined packages with data analysis

COURSE OBJECTIVES :

- To learn the statistical data representation using frequency distribution and graphical representation of data
- To study about quantitative statistical measures
- To understand the concept of hypothesis
- To understand the data design
- To analysis data based on applied statistics.

LIST OF EXPERIMENTS

1. Program to determine Frequency distribution of data

2. Program to represent the Graphical Representation of data

3. Program to predict the Arithmetic mean, Median and Mode

4. Program to find the variation of coefficient

5. Practice Z-Test and F-Test based on sampling distribution

6. Program to determine Chi-square test.

7. Program to find Karl Pearson's Coefficient of Correlations

8. Program to determine analysis of regressions

9. Program to determine analysis of multivariate

10. Determine the Population of Principal Components

                                                    Total No. of Periods : 60

COURSE OUTCOMES:

At the end of course, the Student will be able to:
   CO1 : Develop and Implement Programs for Data Analysis and Visualization.
   CO2 : Apply statistical formulas and methods programmatically to analyze and interpret data.
   CO3 : Utilize statistical software and programming libraries to conduct hypothesis tests and analyze data.
   CO4 : Develop a program to perform regression analysis, including linear regression, to model and analyze relationships between dependent and independent variables.
   CO5 : Implement principal component analysis (PCA) to reduce dimensionality.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAL03 APPLIED STATISTICS FOR DATA ANALYSIS LAB	CO1	3	3	3	3	2	-	1	1	3	2	-
	CO2	3	3	3	3	2	-	1	2	3	2	-
	CO3	3	3	3	3	1	1	1	2	3	2	1
	CO4	3	3	3	3	2	1	1	2	3	2	1
	CO5	3	3	3	3	1	1	1	3	3	2	1
Average		3.00	3.00	3.00	3.00	1.60	1.00	1.00	2.00	3.00	2.00	1.00

122CAL04 PROBLEM SOLVING TECHNIQUES LAB

BASIC PREREQUISITES:

- Number System Concept
- Basic mathematical functions.

COURSE OBJECTIVE :

- To Understand the basic concept of mathematical functions
- To learn various factoring methods
- To gain the knowledge of array with types of dimensions.
- To obtain the knowledge of Text Processing and pattern searching.
- To Practice Recursive algorithms

LIST OF EXPERIMENTS

1. Program to implement number conversion system

2. Program to Compute any Mathematical Functions

3. Program to determine smallest and greatest divisor of an Integer.

4. Program to computing n^{th} Fibonacci Number.

5. Program to remove the duplicate from an ordered array.

6. Finding the Kth Smallest Element from, the given array.

7. Program to search an element using Linear Patten.

8. Program to find the given string is palindrome or not.

9. Implement of Recursive Quicksort.

10. Program to manipulate Tower of Hanoi Problem.

Total No. of Periods : 60

COURSE OUTCOMES :

At the end of course, the Student will be able to:
- **CO1 :** Apply algorithms for accurate number conversions and mathematical computations.
- **CO2 :** Implement the Concept of Factoring methods and Fibonacci Number.
- **CO3 :** Develop a program using array with types of dimensions.
- **CO4 :** Design and develop text processing and pattern searching.
- **CO5 :** To Implement Recursive algorithms and Tower of Hanoi Problem.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAL04 PROBLEM SOLVING TECHNIQUES LAB	CO1	3	3	3	3	1	-	1	1	3	1	-
	CO2	3	3	3	2	1	-	-	-	3	1	-
	CO3	3	3	3	3	1	-	1	2	3	2	-
	CO4	3	3	3	3	1	-	1	2	3	2	1
	CO5	3	3	3	3	1	-	1	1	3	2	1
Average		3.00	3.00	3.00	3.00	1.00	-	1.00	1.50	3.00	1.60	1.00

122CAL05 PYTHON PROGRAMMING LAB

BASIC PREREQUISITES:

- Basic Looping, branching statements and functions
- Fundamental of OOPs Concept
- Knowledge in Scripting Language

COURSE OBJECTIVES :

- To Understand the fundamental concepts of statements and functions
- To enable the knowledge Python data structure and Standard Libraries
- To Perform File operation and Exception handling.
- To implement Inheritance and Integration with Database
- To develop a program with packages and frameworks.

LIST OF EXPERIMENTS

1. Write a python program to implement conditional and branching statements.

2. Design a user defined function and recursive functions.

3. Write a simple program using List, Tuples and Dictionary.

4. Python program to develop functions using standard libraries

5. Write a program to manipulate the various file operations.

6. Python program to implement exception handling

7. Develop a python program using Inheritance.

8. Integrate Web Application in python using MySQL Database.

9. Write a program to make your own module.

10. Design a program to visualize the data using python libraries

Total No. of Periods : 60

COURSE OUTCOMES :

At the end of course, the Student will be able to:
   CO1 : Build a simple application using statement and functions.
   CO2 : Apply the concept of python data structures with standard libraries.
   CO3 : Design an application of exception handling with file operations.
   CO4 : Develop t Web Application using MySQL Database.
   CO5 : Implement an application using Packages and frameworks.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAL05 PYTHON PROGRAMMING LAB	CO1	3	3	2	2	-	-	-	-	3	-	-
	CO2	3	3	2	2	-	-	-	-	3	-	-
	CO3	3	3	2	2	-	-	3	2	3	3	1
	CO4	3	3	3	3	-	3	3	3	3	3	2
	CO5	3	3	3	3	-	3	2	3	3	3	2
Average		3.00	3.00	2.40	2.40	-	3.00	2.67	2.67	3.00	3.00	1.67

BRIDGE COURSE

122CAB01 - FUNDAMENTALS OF COMPUTING AND PROGRAMMING -I

COURSE OBJECTIVES :

- To enable the student to learn the major components of a computer system.
- To know the correct and efficient ways of solving problems
- To learn to basic operating systems concept with internet applications
- To learn to program in C.
- To explore functions and pointer in C

MODULE – I INTRODUCTION TO COMPUTERS

Introduction – Characteristics of Computer – Evolution of Computer – Computer Generation – Classification of Computers – Basic Computer Organization – Number Systems.

MODULE – II PROBLEM SOLVING AND OFFICE APPLICATION SOFTWARE

Planning the Computer Program – Purpose – Algorithm – Flow Charts – Pseudocode – Application Software Packages – Introduction to Office Packages - Getting Connected to Internet Applications.

MODULE – III OPERATING SYSTEMS

Getting Connected to Internet Applications- Operating System Components – System Services – System calls – System Programs – Process Concepts – Process Scheduling – Operation on Process- Cooperation Process – Inter Process communications – CPU Scheduling and Criteria – Scheduling algorithm.

MODULE – IV INTRODUCTION TO C PROGRAMMING

Overview of C Programming – Constants, Variable and Data Types – Operators and Expression – Managing Input and Output Operators – Decision Making - Branching and Looping.

MODULE –V FUNCTIONS AND POINTERS

Handling of Character String – User Defined Functions – Definition – Declarations – Call by Reference – Call by Value- Structure and Unions – Pointers - Arrays – The Preprocessor – Developing C Program

Total Number of Hours : 45

COURSE OUTCOMES :

At the end of course, the Student will be able to:

CO1 : Proficient in basic computer operations such as file management, word processing, and internet navigation

CO2 : Apply advanced features and functions within office applications to automate tasks.

CO3 : analyze different operating system structures and their impact on system performance and resource utilization

CO4 : Apply programming techniques to develop simple applications and algorithms using C.

CO5 : Implement functions to modularize code and enhance code reusability in C programming.

REFERENCES :

1. Herbert Schildt, "C: The Complete Reference",4th Edn., 2017
2. Pradip Dey, Manas Ghoush, "Programming in C", Oxford University Press. (2007).
3. Byron Gottfried, "Programming with C", 2 nd Edition, (Indian Adapted Edition), TMH publications, (2006).
4. Stephen G.Kochan, "Programming in C", Third Edition, Pearson Education India, (2005).
5. Brian W.Kernighan and Dennis M.Ritchie, "The C Programming Language", Pearson Education Inc., (2005).
6. E.Balagurusamy, "Computing fundamentals and C Programming", Tata McGraw-Hill Publishing Company Limited, (2008).
7. S.Thamarai Selvi and R.Murugan, "C for All", Anuradha Publishers, (2008).
8. Abhraham Silberschatz, Greg Gagne, Peter B Galvin,"Operating System Concepts", Eight Edition, Wiley Publication 2019.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAB01 - FUNDAMENTALS OF COMPUTING AND PROGRAMMING -I	CO1	3	2	2	2	1	-	1	1	2	1	-
	CO2	1	1	-	1	1	-	2	2	1	1	-
	CO3	-	-	-	2	1	-	1	1	2	1	2
	CO4	3	3	2	2	1	-	1	2	3	2	1
	CO5	3	3	3	3	1	-	1	1	3	2	1
Average		2.00	1.80	1.40	2.00	1.00	-	1.20	1.40	2.20	1.40	1.30

122CBP01 - FUNDAMENTALS OF COMPUTING AND PROGRAMMING LAB – I

COURSE OBJECTIVES :

- To understand the fundamental concepts of Operators and Conditions statement in C.
- To familiarize students with the concept of loops and their significance in programming.
- To demonstrate various operations and manipulations that can be performed on arrays, such as sorting and searching
- Deep understanding of functions and pointers in C programming
- Understanding of structures and unions in C programming.

LIST OF EXPERIMENTS

1. Implement arithmetic operators using C.

2. Implement Looping Statements using C

3. Implement Conditional Statements using C.

4. Implement Arrays using C.

5. Implement Functions in C.

6. Implement Structure and Union in C.

7. Implement Pointers in C.

COURSE OUTCOMES :

At the end of course, the Student will be able to:

CO1 : Demonstrate proficiency in using addition, subtraction, multiplication, division, and modulus operators in C.
CO2 : Write C programs that utilize loops to execute code iteratively based on specific conditions
CO3 : Develop simple application using Array.
CO4 : Deploy programming concepts such as function pointers and pointer
CO5 : Build and Develop an application with structures and unions.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CBP01 - FUNDAMENTALS OF COMPUTING AND PROGRAMMING LAB – I	CO1	3	3	3	3	1	1	1	1	3	2	-
	CO2	3	3	3	3	1	1	1	1	3	2	-
	CO3	3	3	3	3	2	1	1	1	3	2	-
	CO4	3	3	3	3	2	1	1	1	3	2	-
	CO5	3	3	3	3	2	1	1	1	3	2	-
Average		3.00	3.00	3.00	3.00	1.60	1.00	1.00	1.00	3.00	2.00	-

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122CAE06 - CONSTITUTION OF INDIA

COURSE OBJECTIVES :

- Understand the concept of Historical Movements, principles, and processes involved in the framing of the Indian Constitution
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional.
- Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolutionin1917and its impact on the initial drafting of the Indian Constitution.
- To understand the functioning of Union, State and Local Governments in Indian federal system.

UNIT - I HISTORY OF MAKING OF THE INDIAN CONSTITUTION   5

History, Drafting Committee, (Composition & Working)

UNIT - II PHILOSOPHY OF THE INDIAN CONSTITUTION   5

Preamble, Salient Features

UNIT - III CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES   5

Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT - IV ORGANS OF GOVERNANCE   5

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

UNIT - V LOCAL ADMINISTRATION   5

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy(Different departments), Village level:Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT - VI ELECTION COMMISSION   5

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.

Total Number of Hours : 30

COURSE OUTCOMES :

At the end of course, the Student will be able to:
- **CO1 :** Analyze the significance of Indian Constitution as the fundamental law of the land.
- **CO2 :** Evaluate the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- **CO3 :** Examine the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- **CO4 :** Assess the circumstances surrounding the foundation of the Congress Socialist Party[CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- **CO5 :** Summarize the passage of the Hindu Code Bill of 1956.

REFERENCES :

1. The Constitution of India,1950(Bare Act), Government Publication.
2. Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution,1st Edition,2015.
3. M.P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis,2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAE06 - CONSTITUTION OF INDIA	CO1	-	-	-	-	1	-	3	3	-	1	1
	CO2	-	-	-	-	1	-	3	3	-	1	1
	CO3	-	-	-	-	2	-	3	3	-	1	1
	CO4	-	-	-	-	2	-	3	3	-	1	1
	CO5	-	-	-	-	2	-	3	3	-	1	1
Average		-	-	-	-	1.60	-	3	3	-	1	1

122CAE07 - DISASTER MANAGEMENT

COURSE OBJECTIVES :

- Summarize basics of disaster
- Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Develop the strengths and weaknesses of disaster management approaches

UNIT - I INTRODUCTION   **6**

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT - II REPERCUSSIONS OF DISASTERS AND HAZARDS   **6**

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

UNIT - III DISASTER PRONE AREAS IN INDIA   **6**

Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

UNIT - IV DISASTER PREPAREDNESS AND MANAGEMENT   **6**

Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT - V RISK ASSESSMENT   **6**

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival

Total Number of Hours : 30

COURSE OUTCOMES :

At the end of course, the Student will be able to:
- **CO1 :** Summarize basics of disaster management
- **CO2 :** Evaluate the key concepts in disaster risk reduction and humanitarian response.
- **CO3 :** Analyze disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- **CO4 :** Examine the humanitarian response and practical relevance in specific types of disasters and conflict situations.
- **CO5 :** Assess the strengths and weaknesses of disaster management approaches.

REFERENCES :

1. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep & Deep Publication Pvt. Ltd., New Delhi,2009.
2. NishithaRai, Singh AK, "Disaster Management in India: Perspectives, issues and strategies", NewRoyal book Company,2007.
3. Sahni, PardeepEt.Al. ," Disaster Mitigation Experiences And Reflections", Prentice Hall of India, New Delhi,2001.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
122CAE07 - DISASTER MANAGEMENT	CO1	-	-	-	-	2	1	3	3	-	3	1
	CO2	-	-	-	-	3	1	3	3	-	3	2
	CO3	-	-	-	-	2	1	3	3	-	3	2
	CO4	-	-	-	-	1	1	3	3	-	3	1
	CO5	-	-	-	-	1	1	3	2	-	3	-
Average		-	-	-	-	1.80	1.00	3.00	2.80	-	3.00	1.20

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222CAT01 - ADVANCED JAVA PROGRAMMING

BASIC PREREQUISITES:

- Basic Core Java Programming
- Concept and Features of OOPs
- Fundamental of HTML, CSS and JavaScript

COURSE OBJECTIVES:

- Basic Concept of Core Java.
- Practice Exception Handling and Multithreading
- Provide Knowledge about Client-Side Scripting
- Analyzing the functionalities of Server-Side Scripting
- Understand the prototypes of spring.

UNIT –I   CORE JAVA   **9**

Java Features – Java Platform – Java Fundamental – Expression – Operators – Control Structures – Classes and Object – Inheritance – Polymorphism – Abstract Class – Interface – Packages.

UNIT-II   EXCEPTIONAL HANDLING   **9**

Exception Handling Fundamentals – Exception Types – Java Built-in Exception – Creating Your Own Exception Subclasses – Chained Exception – The Java Thread Model – Thread Priorities- Creating Thread: Implementing Runnable Interface – Synchronization – Inter thread communications.

UNIT – III   JAVASCIRPT   **9**

JavaScript Prototypes – Object Oriented Programming – Class – Modules - Functions Expression – DOM – Events - HTML5 Scripting – JSON – AJAX – Comet.

UNIT – IV   SERVER-SIDE PROGRAMMING   **9**

Web Server: Web Container – Web Components, Servlet: Life Cycle – Request – Servlet Context – Response – Filter – Session – Dispatching Requests – Web Socket – Logging – Log4J2 -Build tool – Gradle.

UNIT – V   SPRING   **9**

Introduction to Spring – Architecture – IoC Container – Bean Definition – Scopes – Life Cycle – Dependency Injection – Annotation – Controller – View – Input Validation – File Upload – Container – Logging with Log4J.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Create a simple applications and algorithms using Java programming language constructs.

CO2 : Implement Exception handling and multithreading in applications

CO3 : Design Client-side scripting applications

CO4 : Develop and design a Server-Side scripting

CO5 : Build and Deploy an application using Spring.

REFERENCES

1. Herbert Schildt, "The Java Complete Reference", 12th Edition, Tata McGraw Hill, 2021.
2. Mark Heckler, "Spring boot in Action", O'Reilly Publications, 2021
3. Alex Banks, Eve Porcello, "Learning React", O'Reilly Media, Inc, 2nd Edition, 2020
4. E. Balaguruswamy, "Programming with JAVA", 6th Edition, Tata McGraw Hill, 2019.
5. Nicholas C. Zakas, "Professional JavaScript for Web Developers", 3rd Edition Wrox Publication 2018.
6. David R. Heffelfinger, "Java EE 8 Application Development", Packt Publishing, First edition2017
7. Benjamin Muschko, "Gradle in Action", Manning Publications, First edition2014
8. Iuliana Cosmina, Rob Harrop, Chris Schaefer, Clarence Ho, "Pro Spring 5: An In-Depth Guide to the Spring Framework and Its Tools", Apress, Fifth edition2017

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAT01 - ADVANCED JAVA PROGRAMMING	CO1	3	3	3	3	-	-	-	1	3	2	-
	CO2	3	3	3	3	-	3	-	3	3	2	2
	CO3	3	3	3	3	-	-	3	2	3	2	2
	CO4	3	3	3	3	3	-	3	3	3	2	3
	CO5	3	3	3	3	2	-	2	3	3	2	3
Average		3.00	3.00	3.00	3.00	2.50	3.00	2.67	2.40	3.00	2.00	2.50

222CAT02 - DATA MINING AND DATA WAREHOUSING

BASIC PREREQUISITES:

* Concept of Database Management System
* Knowledge in Python Programming

COURSE OBJECTIVES:

* To expose the concepts of Data Warehousing Architecture and Implementation.
* To learn the association rule mining for handling large data.
* To understand the concept of classification for the retrieval purposes.
* To identify Business applications and Trends of Data mining.
* To Learn the concept of Data Warehousing with OLAP.

UNIT – I DATA MINING AND DATA PREPROCESSING   **9**

Data Mining Concepts, KDD vs Data mining - DBMS vs Data mining - Data Mining Techniques
- Issues and Challenges - Steps in Data Mining Process - Architecture of a Typical Data Mining
Systems - Data Mining Application Areas - Data Pre-processing: Pre-process the Data, Data
Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept
Hierarchy Generation - Case Studies: Data Mining Applications

UNIT – II MINING ASSOCIATION RULE   **9**

Mining Association Rules: The Naïve Algorithm for Finding Association Rules- Apriori
Algorithm - Partition Algorithm- FPTree Growth Algorithm - Discussion on Different
Algorithms - Incremental Algorithm - Border Algorithm - Association Rules with Item
Constraints.

UNIT – III CLASSIFICATION AND PREDICTION   **9**

Classification by Decision Tree - Bayesian Classification- Bayesian Belief Networks - Rule
Based Classification - Classification by Backpropagation - Support Vector Machines - K-Nearest
Neighbor Algorithm - Prediction

UNIT – IV CLUSTER ANALYSIS AND DATA MINING APPLICATIONS   **9**

Clustering - Requirement for Cluster Analysis, Clustering Methods - Partitioning Methods,
Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of Clustering.
Applications of Data Mining: Applications of Data Mining - Social Impacts of Data Mining -
Spatial data mining - Text mining

UNIT – V DATA WAREHOUSING AND OLAP   **9**

Data Warehousing Components - Multi Dimensional Data Model - Data Warehouse Architecture
- Data Warehouse Implementation - Mapping the Data Warehouse Architecture to
Multiprocessor Architecture - Introduction to OLAP - Need for OLAP Operations -
Categorization of OLAP Tools.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1: Analyze role of data mining and data pre-processing.
CO2: Demonstrate the functionalities of Mining Association Rule.
CO3: Execute a simple Classification and Prediction Algorithm.
CO4: Assess the cluster and develop application based on data mining.
CO5: Build a simple application of Data Warehousing and OLAP

REFERENCES

1. Parteek Bhatia, "Data Mining and Data Warehousing Principles and Practical Techniques", Cambridge Publication, 2019.
2. Arun K.Pujari,"Data Mining Techniques", University Press, 3rd Edition ,2013.
3. Dunham Margaret H, "Data Mining: Introductory and Advanced Topics", Pearson Education, Inc., 2012.
4. Jiawei Han, MichelineKamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann Publishers, 3rd Edition, 2011.
5. Alex Berson, Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw - Hill Edition,2011.
6. David Hand, Heikki Mannila, Padharic Symth," Principles of Data Mining", PHI, 2009.
7. Sean Kelly, "Data Warehousing in Action", John Wiley & Sons Inc, 2007.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
220CAT02 - DATA MINING AND DATA WAREHOUSING	CO1	3	3	3	3	-	-	-	3	3	2	-
	CO2	3	3	3	3	-	-	-	3	3	2	-
	CO3	3	3	3	3	2	2	2	3	3	2	3
	CO4	3	3	3	3	2	2	2	3	3	2	3
	CO5	3	3	3	3	2	-	3	3	3	2	3
Average		3.00	3.00	3.00	3.00	2.00	2.00	2.33	3.00	3.00	2.00	3.00

222CAT03 - FULL STACK WEB DEVELOPMENT

BASIC PREREQUISITES:
- Idea about HTML, CSS, and JavaScript
- Concept of Server-Side Scripting
- Fundamental of Non tabular database.

COURSE OBJECTIVES:
- To Understand the fundamental concept of PHP,Array and PHP Functions.
- To build an application with database and cookies.
- To Construct the Web Page using PHP Framework.
- To learn server side development using NodeJS.and architect databases using NoSQL and SQL databases.
- To learn the advanced client side scripting and ReactJS framework

UNIT I   INTRODUCTION   9

Getting PHP - Frameworks Introduction – Types of Frame works –Creating a First PHP Page-Understanding PHP's Internal Data types- PHP Array Functions Creating function in PHP – Introduction to Variable Scope in PHP – Nesting Functions.-Handling Form Controls.

UNIT II   WORKING WITH DATABASES AND COOKIES   9

Database Introduction – Creating MYSQL Database - Accessing database in PHP – Updating Databases – Inserting item into a Database – Delete Records. Setting a Cookie – Reading a Cookie – Session – Working with FTP – Downloading Files with FTP – Deleting a File with FTP.

UNIT III   SERVER SIDE PROGRAMMING WITH NODE JS   9

Introduction to Web Servers – Javascript in the Desktop with NodeJS – NPM – Serving files with the http module – Introduction to the Express framework – Server-side rendering with Templating Engines – Static Files - async/await - Fetching JSON from Express

UNIT IV   ADVANCED NODE JS AND DATABASE   9

Introduction to NoSQL databases – MongoDB system overview - Basic querying with MongoDB shell – Request body parsing in Express – NodeJS MongoDB connection – Adding and retrieving data to MongoDB from NodeJS – Handling SQL databases from NodeJS – Handling Cookies in NodeJS – Handling User Authentication with NodeJS

UNIT V   ADVANCED CLIENT SIDE PROGRAMMING   9

React JS: React DOM - JSX - Components - Properties – Fetch API - State and Lifecycle - JS Local storage - Events - Lifting State Up - Composition and Inheritance

Total No. of Periods: 45

COURSE OUTCOMES:
At the end of course, the Student will be able to:

CO1 : Execute the fundamental concept of PHP, Array and Functions
CO2 : Create a simple application using database and cookies
CO3 : Deploy a simple web based application using NodeJS
CO4 : Design and develop applications using NodeJS with Structure and Non- Structure database.
CO5 : Implement simple server side application using React JS.

REFERENCES:

1. Paul Zikopoulos, Christopher Bienko, Chris Backer, Chris Konarski, Sai Vennam, Cloud Without Compromise", O'Reilly Media, 1st edition, 2021
2. Paul Gibbs, PHP Tutorials-Programming With PHP and Mysql, Revised and Updated ,5th Edition, Dec 2020 .
3. Kevin Tatore, Peter MacIntyre and Rasmus Lerdorf, Programming PHP, O'Reilly, 2015.
4. Steven Holzner, PHP The Completer Reference, McGraw Hill Education, reprint 2013.
5. David Sklar and Adam Tracktenberg, PHP Cookbook, Oreilly, 2nd Edition,2010.
6. David Flanagan, "Java Script: The Definitive Guide", O'Reilly Media, Inc, 7th Edition, 2020
7. Alex Banks, Eve Porcello, "Learning React", O'Reilly Media, Inc, 2nd Edition, 2020
8. Matt Frisbie, "Professional JavaScript for Web Developers", Wiley Publishing, Inc,4th Edition, ISBN: 978-1-119-36656-0, 2019

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAT03 - FULL STACK WEB DEVELOPMENT	CO1	3	3	3	3	-	-	-	-	3	2	-
	CO2	3	3	3	3	3	-	-	-	3	2	-
	CO3	3	3	3	3	-	-	2	2	3	2	2
	CO4	3	3	3	3	3	3	3	3	3	2	3
	CO5	3	3	3	3	3	-	2	3	3	2	3
Average		3.00	3.00	3.00	3.00	3.00	3.00	2.33	2.67	3.00	2.00	2.67

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222CAT04 - CLOUD COMPUTING

BASIC PREREQUISITES:

- Basic concept of Centralized vs Distributed System
- Idea about Client Server Technology.
- Fundamental concept of Database Management System.

COURSE OBJECTIVES:

- To Understand the fundamentals of cloud computing.
- To Learn the basics of cloud computing
- To Understand the functionalities of Cloud infrastructure
- Expose Knowledge of cloud computing technologies.
- Learn about the security used in cloud computing

UNIT-I FUNDAMENTALS OF CLOUD COMPUTING   9

Introduction to Distributed Systems – Characterization of Distributed Systems – Distributed Architectural Models – Remote Invocation – Request – Reply Protocol – Remote Procedure Call – Remote Method Invocation – Group Communication – Coordination in Group Communication – Ordered Multicast – Time Ordering – Physical Clock Synchronization – Logical Time and Logical Clocks.

UNIT – II   BASICS OF CLOUD COMPUTING   9

Cloud Computing Basics- Desired Features of Cloud Computing- Elasticity in Cloud- On-Demand Provisioning – Applications – Benefits – Cloud Components: Clients, Datacentres & Distributed Servers – Principles of Parallel and Distributed Computing – Application of Cloud Computing – Benefits – Cloud Services – Open-Source Cloud Software: Eucalyptus, Open Nebula, Open Stack, Cloudsim.

UNIT – III CLOUD INFRASTRUCTURE   9

Cloud Architecture and Design – Architecture Design Challenges - Technologies for Network-Based System – NIST – Cloud Computing Reference Architecture – Public, Private, and Hybrid Clouds – Cloud Models: IaaS, PaaS, and SaaS – Cloud Storage providers – Enabling Technologies for the Internet of Things – Innovative Application of Internet of Things.

UNIT – IV CLOUD ENABLING TECHNOLOGIES   9

Service Oriented Architecture – Web Services – Basics of Virtualization – Emulation – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU, Memory, and I/O Devices – Desktop Virtualization – Server Virtualization – Google App Engine – Amazon AWS – Federation in cloud.

UNIT – V SECURITY IN CLOUD   9

Security Overview – Cloud Security Challenges and Risks – Software as Service Security – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security – Identity Management and Access Control – Autonomic Security.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Evaluate the process of fundamental cloud computing.
CO2 : Examine the functionalities of Cloud computing
CO3 : Assess the various types of Cloud Infrastructures.
CO4 : Analyze the utilization of cloud-enabling technologies
CO5 : Assess the various security and standards in the cloud.

REFERENCES:

1. Douglas Comer, "The cloud Computing: The Future of Computing", CRS Publication, 2021.
2. Sandeep Bowmik, "The Cloud Computing", Cambridge University, 2017.
3. Kai Hwang, Geoffrey C. Fox & Jack J Dongarra, "Distributed and Cloud Computing From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, First Edition, 2012.
4. Andrew S. Tanenbaum & Maarten Van Steen, "Distributed System – Principles and Paradigm", Third Edition, Pearson, 2017.
5. Thomas Erl, Zaigham Mahood and Ricardo Puttini, "Cloud Computing, Concept, Technology and Architecture", Prentice Hall, Second Edition, 2013.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAT04 - CLOUD COMPUTING	CO1	2	2	3	3	3	-	-	3	3	3	3
	CO2	2	2	3	3	3	-	2	3	3	3	3
	CO3	-	-	3	3	3	-	2	3	3	2	-
	CO4	-	-	3	3	3	-	3	3	3	2	-
	CO5	-	-	3	3	3	-	3	2	2	2	-
Average		2.00	2.00	3.00	3.00	3.00	-	2.50	2.80	2.80	2.40	3.00

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222CAP01- ADVANCED JAVA PROGRAMMING LAB

BASIC PREREQUISITES:
- Basic Core Java version 8
- Concept and Features of OOPs
- Fundamental of HTML, CSS, and JavaScript

COURSE OBJECTIVES:

- Understand the prototypes of Java Programming
- Practice Interface, Abstract, and Multithreading.
- Gain knowledge in Client-Side Scripting
- Understand Prototypes of Server-Side Scripting.
- Knowledge about Spring.

LIST OF EXPERIMENTS

1. Practice Control Structures and Loop through Simple Program

2. Program to implement abstract and interface.

3. Program to implement Exception Handling.

4. Practice a program with the Multithreading concept.

5. Develop a function using DOM

6. Design and develop a simple scripting application using JSON.

7. Implement a simple server-side application using servlet.

8. Design and develop server scripting using Web Socket.

9. Develop a simple application using Spring with Dependency Injection.

10. Develop an application with input validation using Spring.

Total No. of Periods: 60

COURSE OUTCOMES:

At the end of course, the Student will be able to:
   CO1. Execute a simple application using fundamental concept of Java
   CO2. Create a simple application using Exception handling and Multithreading concepts.
   CO3. Apply a DOM and JSON to create a simple application.
   CO4. Design and develop a server-side application using Servlet and Sockets.
   CO5. Implement an application using Spring.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAP01-ADVANCED JAVA PROGRAMMING LAB	CO1	3	3	3	3	-	-	-	-	3	3	-
	CO2	3	3	3	3	-	1	-	-	3	3	-
	CO3	3	3	3	3	2	2	3	3	3	3	-
	CO4	3	3	3	3	3	2	3	3	3	3	3
	CO5	3	3	3	3	3	-	2	3	3	3	3
Average		3.00	3.00	3.00	3.00	2.67	1.67	2.67	3.00	3.00	3.00	3.00

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222CAE01- MACHINE LEARNING TECHNIQUES

BASIC PREREQUISITES:

- Conception about Artificial Intelligence
- Idea about Techniques used in Artificial Intelligence
- Fundamental Concept of Python Programming

COURSE OBJECTIVES:

- To study the basics of machine learning
- To learn linear models
- To understand distance based clustering techniques
- To know about tree and rule based models
- To understand ensemble learning

UNIT-I INTRODUCTION   9

Machine learning - Task: problems solved with machine learning, Looking for structure, Performance evaluation - Models: Geometric models, Probabilistic models, Logical models, Grouping and grading –Features – Binary Classification: Classification, Scoring and ranking, Class probability estimation - Handling more than two classes - Regression-Movie genre identification and rating system.

UNIT-II LINEAR MODELS   9

Concepts: Supervised, Unsupervised and Descriptive learning - Hypothesis space - Linear classification – univariate linear regression - multivariate linear regression - logistic regression - perceptron - multilayer neural networks - learning neural networks structures - support vector machines- Credit card approval system

UNIT III DISTANCE-BASED MODELS   9

Distance and measure - Neighbours and exemplars - Nearest neighbour classification - Distance based clustering: Kmeans algorithm, clustering around medoids - clustering using kernels - silhouettes - hierarchical clustering - Document clustering

UNIT-IV TREE AND RULE MODELS   9

Decision trees - learning decision trees - ranking and probability estimation trees - regression trees -clustering trees - learning ordered rule lists - learning unordered rule lists - descriptive rule learning - first- order rule learning- spam filtering

UNIT-V MODEL ENSEMBLES   9

Features: Kinds of feature, Feature transformation, Feature Construction and Selection - Ensemble learning: bagging and random forests - Boosting: Boosted rule learning - Mapping the ensemble landscape: Bias, variance, margin, other ensemble methods - Meta learning -Diabetes diagnosis system.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:
- **CO1 :** Create a simple application using machine learning
- **CO2 :** Apply the linear modelling techniques to solve a problem
- **CO3 :** Analyze the process of distance base models.
- **CO4 :** Evaluate the functionalities of tree and rule models.
- **CO5 :** Apply various model ensemble learning techniques

REFERENCES:

1. Manaranjan Pradhan and Dinesh Kumar U., "Machine Learning using Python", Wiley India Pvt. Ltd., 2019.
2. Brink Henrik, Richards Joseph W & Fetherolf Mark, "Real-World Machine Learning", 2nd Edition, Dreamtech Press, 2017
3. K. P. Murphy, "Machine Learning: A probabilistic perspective", MIT Press, 2012.
4. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2007.
5. M. Mohri, A. Rostamizadeh, and A. Talwalkar, "Foundations of Machine Learning", MIT Press, 2012.
6. P. Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAE01- MACHINE LEARNING TECHNIQUES	CO1	3	3	3	3	1	1	1	2	3	3	-
	CO2	3	3	3	3	1	1	1	2	3	3	-
	CO3	3	3	3	3	2	1	2	3	3	3	1
	CO4	3	3	3	3	2	1	2	3	3	3	2
	CO5	3	3	3	3	2	1	2	3	3	3	2
Average		3.00	3.00	3.00	3.00	1.60	1.00	1.60	2.60	3.00	3.00	1.60

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222CAE02- INTERNET OF THINGS

BASIC PREREQUISITES:
- Basic idea about different types of Sensors
- Concepts of Network Connectivity
- Idea about the Artificial Intelligence

COURSE OBJECTIVES:

- Understand the fundamental concept of loT.
- To Learn the various protocols for loT.
- Gain Knowledge of Design and Development in Raspberry Pi.
- Understand the functionalities of data analytics in loT.
- Learn to adapt with industrial applications.

UNIT - I FUNDAMENTALS OF loT   9

Evolution of Internet of Things - Enabling Technologies - loT Architectures: oneM2M, loT World Forum (loTWF) and Alternative loT models - Simplified loT Architecture and Core loT Functional Stack - Fog, Edge , and Cloud in loT - Functional blocks of a loT ecosystem - Sensors, Actuators, Smart Objects and Connecting Smart Objects.

UNIT - II loT PROTOCOLS   9

loT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11 ah and LoRaWAN - Network Layer: IP versions, Constrained Nodes and Constrained Networks - Optimizing IP for loT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks - Application Transport Methods: Supervisory Control and Data Acquisition - Application Layer Protocols: CoAP and MQTT.

UNIT - III DESIGN AND DEVELOPMENT   9

Design Methodology - Embedded computing logic - Microcontroller, System on Chips - loT system building blocks - Arduino - Board details, IDE programming - Raspberry Pi - Interfaces and Raspberry Pi with Python Programming.

UNIT - IV DATA ANALYTICS AND SUPPORTING SERVICES   9

Structured Vs Unstructured Data and Data in Motion Vs Data in Rest - Role of Machine Learning - No SQL Databases - Hadoop Ecosystem - Apache Kafka, Apache Spark - Edge Streaming Analytics and Network Analytics - Xively Cloud for loT, Python Web Application Framework - Django -AWS for loT - System Management with NETGONF-YANG.

UNIT - V INDUSTRIAL APPLICATIONS   9

Cisco loT system - IBM Watson loT platform - Manufacturing - Converged Plantwide Ethernet Model (CPwE) - Power Utility Industry – Grid Blocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:
CO1: Create a simple IoT solutions.
CO2: Summarize the process of IoT communication protocols.
CO3: Design and develop end-to-end IoT solutions.
CO4: Apply data analytics techniques to extract various services from large datasets.
CO5: Implement IoT solutions tailored to specific industrial sectors

REFERENCES:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete. Rob Barton and Jerome Henry, "loT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2020
2. Arshdeep Bahga, Vijay Madisetti, ―Internet of Things – A hands-on approach‖, Universities Press, 2017
3. Olivier Hersent, David Boswarthick, Omar Elloumi, ―The Internet of Things – Key applications and Protocols‖, Wiley, 2015
4. Jan Ho¨ ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
5. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), ―Architecting the Internet of Things‖, Springer, 2011.
6. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance your projects, 2nd Edition, O'Reilly_Media,_2011.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAE02-INTERNET OF THINGS	CO1	-	-	3	3	2	2	2	3	3	2	-
	CO2	-	-	3	3	2	2	2	3	3	2	-
	CO3	2	2	3	3	2	3	2	3	3	3	1
	CO4	3	3	3	3	2	2	1	3	3	3	2
	CO5	2	2	3	3	2	2	1	3	3	3	3
Average		2.30	2.30	3.00	3.00	2.00	2.20	1.60	3.00	3.00	2.20	2.00

222CAE03 – BLOCK CHAIN TECHNOLOGY

BASIC PREREQUISITES:
- Essentials of Distributed System
- Foundation of Networking
- Basic idea of Cryptography

COURSE OBJECTIVES:
- Understand the fundamental concept of Block chain.
- Understanding of the various consensus mechanisms utilized in the Bitcoin network
- Fundamental principles of Bitcoin's consensus mechanisms and their role in maintaining the integrity of the block chain
- Principles and challenges of distributed consensus in decentralized networks
- Understanding of Ethereum block chain platforms

UNIT – I   INTRODUCTION TO BLOCK CHAIN   9

Block chain- Public Ledgers, Block chain as Public Ledgers -Bitcoin, Block chain 2.0, Smart Contracts, Block in a Block chain, Transactions-Distributed Consensus, The Chain and the Longest Chain - Cryptocurrency to Block chain 2.0 - Permissioned Model of Block chain, Benefits and limitations of blockchain-Features of a blockchain.

UNIT – II   BITCOIN AND CRYPTOCURRENCY   9

A basic crypto currency, Creation of coins, Payments and double spending, FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay, Consensus introduction, Distributed consensus in open Environments-Consensus in a Bitcoin network.

UNIT – III   BITCOIN CONSENSUS   9

Bitcoin Consensus, Proof of Work (PoW)- Hash cash PoW, Bitcoin PoW, Attacks on PoW ,monopoly problem- Proof of Storage, Proof of Stake- Proof of Burn-Proof of Activity (PoA) Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases, Design issues for Permissioned Block chains, Execute contracts- Consensus models for permissioned block chain-Distributed consensus in closed environment Paxos.

UNIT – IV   DISTRIBUTED CONSENSUS   9

RAFT Consensus-Byzantine general problem, Byzantine fault tolerant system Agreement Protocol, Lamport-Shostak-Pease BFT Algorithm-BFT over Asynchronous systems, Practical Byzantine Fault Tolerance

UNIT –V   ETHERUM   9

Ethereum network, EVM, Transaction fee, Mist Browser, Ether, Gas, Solidity, Smart contracts, TruffleDesign and issue Crypto currency, Mining, DApps-Requirements and operation of DApps, DAO.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Assess the basic block chain solutions using appropriate development tools and platforms

CO2 : Analyze the economic factors driving the adoption and value of cryptocurrencies

CO3 : Summarize the distributed consensus mechanisms for specific use cases, considering factors such as fault tolerance, network latency, and resource efficiency

CO4 : Apply Hyper Ledge Fabric and Etheric platform to implement the block chain application

CO5 : Develop and deploy blockchain applications on Ethereum platforms using appropriate development tools and frameworks.

REFERENCES:

1. Chandramouli Subramanian, Block chain Technology, Universities Press (India) Pvt. Ltd., First edition 19 August 2020.
2. Kim, Shiho, and Ganesh Chandra Deka, eds. Advanced applications of block chain technology. Springer, 2020.
3. Mastering Block chain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Block chain frameworks by Bashir, Imran,2017.
4. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.
5. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015.
6. Bashir, Imran. Mastering block chain. Packt Publishing Ltd, 2017.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAE03 – BLOCK CHAIN TECHNOLOGY	CO1	-	2	3	3	3	2	1	3	3	3	-
	CO2	-	2	3	3	2	2	1	3	3	2	1
	CO3	-	2	3	3	2	2	2	3	3	3	1
	CO4	-	1	3	3	2	2	1	3	3	3	1
	CO5	-	2	3	3	2	2	1	3	3	2	1
Average		-	1.80	3.00	3.00	2.20	2.00	1.20	3.00	3.00	2.40	1.00

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222CAE04 - MOBILE COMPUTING

BASIC PREREQUISITES:
- Awareness of Wireless Architecture
- Concept of Wireless Packets

COURSE OBJECTIVES:
- Foundational concepts, technologies, and applications of mobile computing.
- Understanding of mobile Internet Protocol (IP) and transport layer protocols.
- learn the principles and technologies behind modern mobile networks.
- Provide a solid foundation in mobile ad-hoc networks (MANETs).
- Comprehensive Understanding of Mobile Platforms and Development

UNIT - I INTRODUCTION 9

Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Architecture - Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

UNIT - II MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER 9

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization– Dynamic Host Configuration Protocol (DHCP). Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT - III MOBILE TELECOMMUNICATION SYSTEM 9

Cellular Mobile Communication – Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

UNIT - IV MOBILE AD-HOC NETWORKS 9

Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security–Attacks on Ad-Hoc network–Security Attack Countermeasures.

UNIT – V MOBILE PLATFORMS AND APPLICATIONS 9

Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone - Applications of M-Commerce – B2B – Structure – Pros & Cons – Mobile Payment System – Security Issues.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1: Analyze the challenges and opportunities of mobile computing.
CO2: Evaluate performance metrics and optimization techniques for mobile IP and transport layer protocols.
CO3: Assess the functionalities of Mobile Telecommunication Systems.
CO4: Examine the performance and reliability of Mobile Ad-Hoc networks.
CO5: Design and Develop a simple Mobile Applications

REFERENCES:

1. Tarkeshwar Barua, Ruchi Doshi, Kamal Kant Hiran, Mobile Applications Development 2020
2. Mutamed Khatib and Nael Salman,"Mobile Computing" Intech Open Publication, 2018.
3. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi – 2012.
4. Raj Kamal, "Mobile Computing", Second Edition, Oxford University Press,May 2019.
5. Himanshu Dwivedi, Chris Clark, David Thiel, "Mobile Application Security", Tata McGraw-Hill, 2016.
6. Wei-Meng Lee, "Beginning Andriod Application Development", Wiley India Pvt. Ltd, 2011.
7. Jochen H. Schiller, "Mobile Communications", Second Edition, Pearson Education, 2009.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAE04 - MOBILE COMPUTING	CO1	-	2	3	3	1	1	1	3	3	3	-
	CO2	-	2	3	3	1	1	1	3	3	3	-
	CO3	-	3	2	3	1	1	1	3	3	2	-
	CO4	-	1	2	3	1	1	1	3	3	2	1
	CO5	2	3	2	3	1	1	1	3	3	2	1
Average		2.00	2.20	2.40	3.00	1.00	1.00	1.00	3.00	3.00	2.40	1.00

222CAE05 - C# AND DOT NET PROGRAMMING

BASIC PREREQUISITES:
- Fundamental of Procedure Programming in C
- Basic concept of OOPs in C++

COURSE OBJECTIVES:

- The fundamental concepts and syntax of the C# programming language.
- To equip students with a deep understanding of object-oriented programming principles
- To enable students to comprehend and utilize advanced features of the C# programming language
- To provide students with the knowledge and skills necessary to design and develop user-friendly Windows application forms using graphical user interface (GUI) components.
- To familiarize students with the concepts and techniques of data access using ADO.NET for building database-driven applications

UNIT - I C# LANGUAGE FUNDAMENTALS   9

The Building Block of the .NET Platform (CLR,CTS, and CLS) – Overview of Assemblies - The Anatomy of a Simple C# Program - Defining Classes and Creating Objects - The System Console Class-Establishing Member Visibility - Default Values of Class Member Variables-Member Variable Initialization Syntax- Static Keyword - Method Parameter Modifiers - Iteration Constructs - Decision Constructs and the Relational / Equality Operators - Understanding Value Types and Reference Types-Boxing and Unboxing - Working with .NET Enumerations - Overriding Some Default Behaviors of System. Object - The System Data Types - String Data Type - .NET Array Types - Custom Namespaces.

UNIT - II OBJECT ORIENTED PROGRAMMING WITH C#   9

Understanding the C# Class Type - Reviewing the Pillars of OOP - The First Pillars: C#'s Encapsulation Services, The Second Pillar: C#'s Inheritance Support - Programming for Containment/Delegation - The Third Pillar: C#'s Polymorphic Support-C# Casting Rules - Understanding Object Lifetime - Basics of Object Lifetime - Role of Application Roots - Garbage Collection - Building Finalizable and Disposable Types. Exception Handling - Throwing a Generic Exception - Catching Exceptions.

UNIT - III C# ADVANCED FEATURES   9

Defining Interfaces in C#-Implementing an Interface in C# - Contrasting Interfaces to Abstract Base Classes-Building Interface Hierarchies - Building Enumerable Types (IEnumerable and IEnumerator) Building Cloneable Objects (ICloneable) -Building Comparable Objects (IComparable) -The Interfaces of the System - Collections Namespace - Defining a Delegate in C# -Simplest Possible Delegate Example-Enabling Multicasting -C# Events - Lamdas Expression.

UNIT-IV DEVELOPING WINDOW APPLICATION FORMS   9

Windows Forms Types - Application Class- Functionality of the Control Class - Functionality of the Form Class- Building Windows Applications - Working with Status Strips - Working with ToolStrips - Building an MDI Application - Basic Controls.

UNIT-V ADO.NET AND ASP.NET   9

ADO.NET: Introduction, ADO.NET architecture, The Connected Layer: DataProviders, DataAdapter, DataReader, ExecuteNonQuery method, ExecuteReader method,ADO.NET Overview – Using Database Connections, Commands, The Data Reader, The DataSet Class, Introducing ASP.NET web forms: Server Controls, Data Binding – Crystal Report- ASP.NET State Management, Tracing, Caching, Error Handling, Security, Deployment, User and Custom Controls - Master Pages - Windows Communication Foundation (WCF) – Introduction to Web Services.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:
- **CO1.** Execute a simple application using C#.
- **CO2.** Create a simple application using OOPs concepts.
- **CO3.** Implement the advanced features of C#
- **CO4.** Develop a simple window applications using forms in c#.
- **CO5.** Design and Deploy a application using ADO.Net and ASP. Net.

REFERENCES

1. Andrew Troelsen, "Pro C# 5.0 and the .NET 4.5 Framework" Apress, Sixth Edition,2021 ISBN: 978-1-4302-4233-8
2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2012.
3. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.
4. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2004.
5. O`Reilly "Programming C# 5.0" ,O'Reilly Media ISBN: 978-1-4493-2041-6 | ISBN 10:1-4493-2041-4, October 2012.
6. Michael Schmalz "C# Database Basics" O'Reilly Media ISBN:978-1-4493-0998-5, 2012

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAE05 - C# AND DOT NET PROGRAMMING	CO1	3	3	3	3	-	-	-	-	3	3	-
	CO2	3	3	3	3	-	-	-	-	3	3	-
	CO3	3	3	3	3	2	2	2	2	3	3	-
	CO4	3	3	3	3	2	2	2	3	3	3	2
	CO5	3	3	3	3	2	-	2	3	3	3	3
Average		3.00	3.00	3.00	3.00	2.00	2.00	2.00	2.67	3.00	3.00	2.50

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222CAE06- PROFESSIONAL COMMUNICATION

BASIC PREREQUISITES:

- Basic Concept of Communication Skills
- Idea about Active Listening

COURSE OBJECTIVES:

- Understand the basics concept of Technical Communication
- Teach the essential components of technical written communication
- Understand the different formats and mediums available for conveying technical information effectively.
- Practice to make an effective presentation strategy, including how to plan, organize, and deliver engaging and impactful presentations
- Prepare students for successful entry into the workforce and help them navigate their professional careers effectively.

UNIT – I BASICS OF TECHNICAL COMMUNICATION   9

Technical Communication – Features - Distinction between General and Technical Communication - Language as a Tool of Communication - Levels of Communication: Interpersonal, Organizational and Mass Communication - The Flow of Communication: Downward, Upward, Horizontal and Diagonal - Importance of Technical Communication - Barriers to Communication.

UNIT – II CONSTITUENTS OF TECHNICAL WRITTEN COMMUNICATION   9

Word Formation - Synonyms and Antonyms (select vocabulary of about 500-1000 new words) – Abbreviations and Acronyms – Homonyms – Odd Man Out – Creative and Critical Thinking - Requisites of Sentence Construction - Paragraph Development: Techniques and Methods - Inductive, Deductive, Spatial, Linear, Chronological etc; Essay Writing – Narrative – Argumentative - Reading and Interpretation.

UNIT – III FORMS OF TECHNICAL COMMUNICATION   9

Business Letters: Sales and Credit letters - Letter of Enquiry - Letter of Quotation, Order, Claim and Adjustment Letters - Job Application and Résumé - Reports: Types – Significance – Structure - Style & Writing of Reports – Agenda – Minutes of Meeting – Advertisement – Fliers – Brochures – Faxes – Internet Websites – Intranet Websites – Extranet Websites – Blogging.

UNIT – IV PRESENTATION STRATEGIES   9

Defining Purpose - Analyzing Audience & Locale - Organizing Contents - Modes of Delivery: Extemporaneous, Manuscript, Impromptu and Memorization - Kinesics – Proxemics – Paralinguistics – Chronemics.

UNIT – V CAREER SKILLS   9
One word substitution - Compound nouns - Phrasal verbs - Concord - British and American English - Infinitive and gerund - Life etiquettes - Emotional intelligence - Work ethic

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Convey complex technical concepts in an understandable and professional way.

CO2 : Assess the technical written content that meets industry standards.

CO3 : Demonstrates their ability to adapt their communication style

CO4 : Create and deliver professional presentations that effectively communicate their message.

CO5 : Perceive professional resumes and cover letters, conduct successful job searches, and excel in job interviews.

REFERENCES:

1. N. Uttham Kumar, "Professional English I & II", (with work book), Sahana Publications, Coimbatore, 2011.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, New Delhi.
3. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.
4. Effective Technical Communication by Barun K. Mitra, Oxford Univ. Press, 2006, New Delhi.
5. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., New Delhi.
6. How to Build Better Vocabulary by M.Rosen Blum, Bloomsbury Pub. London.
7. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors; Delhi.
8. Developing Communication Skills by Krishna Mohan, Meera Banerji- Macmillan India Ltd. Delhi.
9. Manual of Practical Communication by L.U.B. Pandey & R.P. Singh; A.I.T.B.S. Publications India Ltd., Krishan Nagar, Delhi.

| Course Name | COs | Program outcomes (Washington Accord Attributes) | | | | | | | | PSOs | | |
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAE06- PROFESSIONAL COMMUNICATION	CO1	-	-	-	1	3	-	-	3	-	3	3
	CO2	-	-	-	1	3	-	3	3	-	3	3
	CO3	-	-	-	1	3	-	2	3	-	3	3
	CO4	-	-	-	1	3	-	-	3	-	3	3
	CO5	-	-	-	1	3	-	3	3	-	3	3
Average		-	-	-	1.00	3.00	-	2.67	3.00	-	3.00	3.00

222CAE07-PERSONALITY DEVELOPMENT

BASIC PREREQUISITES:
- Concepts of Social Graces.
- Awareness about grooming
- Idea about Speech and Interpersonal Skills.

COURSE OBJECTIVES:

- Understand the Key Concept of Personality Development.
- Explore the Knowledge in Self Grooming
- To Learn about the Social and Corporate Etiquettes.
- Gain Knowledge in Effective Communications.
- To Practice in Techniques of Personality Development.

UNIT -I   INTRODUCTION TO PERSONALITY DEVELOPMENT: 9

Personality traits and theories - Self-Image and Self-Concept - Dressing Sense and Table Mannerisms, Diet, Exercise - Mental Health, Body Language.

UNIT -II   SELF GROOMING   9

Group Dynamics, Team Building, Time Management, Positive Attitude, Self-esteem, Self confidence, Assertiveness, Motivation Self grooming being an essential aspect of personality holds due importance. Creating positive attitude, confidence and mental ability to handle situations for constructive learning

UNIT -III   SOCIAL AND CORPORATE ETIQUETTES   9

Interpersonal Relations, Communication in organizations, Personal Branding, Leadership Skills, Presentation Skills, Personal skills- Negotiation skills, Conflict Management, Anger Management - emphasizes on developing negotiation skills, self presentation, creating a brand for self etc. required to work with groups from different disciplines, backgrounds, and expertise to accomplish organizational goals.

UNIT – IV   EFFECTIVE COMMUNICATION SKILLS   9

Effective Communication Skills: Effective Communication, Effective Speaking, Effective Listening, Persuasive Skills, Interview Skills

UNIT- V   TECHNIQUES OF PERSONALITY DEVELOPMENT   9

Techniques of Personality Development Techniques of Personality Development: Stress Management, handling stress, Time Management, Team Building, Goal Setting. Soft Skills: Knowing Yourself (SWOT), Emotional Intelligence, Empathy, Interpersonal Skills

Total No. of Periods: 45

COURSE OUTCOMES:
 At the end of course, the Student will be able to:

CO1 : Examine the role of Personality Development.
CO2 : Maintain perfection in Self grooming
CO3 : Adapt to Corporate and social Etiquettes
CO4 : Present effective communications.
CO5 : Adapt with various techniques in Personality Development.

REFERENCES:

1. Alex K., Soft Skills – Know Yourself and Know the World, S. Chand & Company Pvt. Ltd., New Delhi, Third Revised Edition, 2016.
2. Bhatnagar Nitin and Mamta Bhatnagar, Effective Communication and Soft Skills: Strategies for Success, Pearson Education, New Delhi, 2011.
3. Chaturvedi P.D., Fundamentals of Business Communication, Pearson Education, New Delhi, 2012.
4. Dulek Ronald E. and John S. Fielden, Principles of Business Communication, Macmillan Publishing Company, London, 1990.
5. Francis Peter S.J., Soft Skills and Professional Communication, Tata McGraw Hill, New Delhi, 2012.
6. Goleman Daniel, Emotional Intelligence, BloomsBury Publishing, New Delhi, 2013.
7. Masters and Wallace, Personal Development for Life and Work, South-Western Cengage Learning, USA, 2010.
8. Onkar R.M., Personality Development and Career Management (A Pragmatic Perspective), S. Chand & Company Pvt. Ltd., New Delhi, Third Revised Edition, 2014

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAE07-PERSONALITY DEVELOPMENT	CO1	-	-	-	-	3	1	3	3	-	3	2
	CO2	-	-	-	-	3	1	3	3	-	3	1
	CO3	-	-	-	-	3	1	3	3	-	3	2
	CO4	-	-	-	-	3	2	3	3	-	3	3
	CO5	-	-	-	-	3	2	3	3	-	3	3
Average		-	-	-	-	3.00	1.40	3.00	3.00	-	3.00	2.20

222CAE08 – APTITUDE SKILL TRAINING

BASIC PREREQUISITES:
- Fundamental problem-solving techniques
- Concept of Critical Thinking and numerical ability.

COURSE OBJECTIVES:
- To learn the basics functionalities of Mathematics
- To Gain the Knowledge of Arithmetic Ability.
- To explore the fundamental statistics to develop aptitude skill.
- To understand the various graphs using data interpretation.
- To practice in Deductive reasoning.

UNIT-I   BASIC MATHEMATICS   9

Number Systems - LCM and HCF - Decimal Fractions – Simplification - Square Roots and Cube Roots - Average -Problems on Ages - Surds & Indices – Percentages - Problems on Numbers

UNIT – II   ARITHMETIC ABILITY   9

Permutation and Combinations – Probability - Profit and Loss - Simple and Compound Interest - Time, Speed and Distance - Time & Work - Ratio and Proportion – Area - Mixtures and Allegation

UNIT – III   ELEMENTARY STATISTICS   9

Mean , Median , Mode , Standard Deviation and Variance

UNIT – IV   DATA INTERPRETATION   9

Tables - Column Graphs - Bar Graphs - Line Charts - Pie Chart - Venn Diagrams

UNIT – V   DEDUCTIVE REASONING   9

Analogy - Blood Relation - Directional Sense - Number and Letter Series - Coding – Decoding - Calendars – Clocks - Venn Diagrams - Seating Arrangement.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:
- **CO1 :** Solve the fundamental concept of mathematics
- **CO2 :** Execute the arithmetic problem effectively.
- **CO3 :** Analyze to solve the various Statistics
- **CO4 :** Build the problem related to data interpretation using graphs.
- **CO5 :** Analyze the various level of reasoning.

REFERENCES:

1. A Modern Approach To Verbal & Non Verbal Reasoning By R S Agarwal
2. Analytical and Logical reasoning By Sijwali B S
3. Quantitative aptitude for Competitive examination By R S Agarwal
4. Analytical and Logical reasoning for CAT and other management entrance test By Sijwali B S
5. Quantitative Aptitude by Competitive Examinations by Abhijit Guha 4 th edition.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAE08 – APTITUDE SKILL TRAINING	CO1	3	3	-	1	1	-	2	2	-	2	2
	CO2	3	3	-	1	1	-	2	2	-	2	2
	CO3	3	3	-	1	1	-	1	2	-	1	1
	CO4	3	3	-	1	1	-	1	2	-	1	1
	CO5	3	3	-	1	1	-	1	2	-	1	1
Average		3.00	3.00	-	1.00	1.00	-	1.40	2.00	-	1.40	1.40

222CAE09- ENTREPRENEURSHIP DEVELOPMENT

BASIC PREREQUISITES:
- Idea about mentor, client, and customer
- Fundamental of leadership and partner skills
- Concept about the risk

COURSE OBJECTIVES:
- To equip and develop the learners entrepreneurial skills and qualities essential to undertake business.
- To impart the learner's entrepreneurial competencies needed for managing business efficiently and effectively.
- To explain concepts of Entrepreneurship and build an understanding about business situations in which entrepreneurs act
- To qualify students to analyze the various aspects, scope and challenges under an entrepreneurial venture
- To explain classification and types of entrepreneurs and the process of entrepreneurial project development and discuss the steps in venture development and new trends in entrepreneurship.

UNIT – I ENTREPRENEURIAL COMPETENCE   **9**

Entrepreneurship concept-Entrepreneurship as a Career-Entrepreneurial Personality - Characteristics of Successful Entrepreneurs-Knowledge and Skills of an Entrepreneur.

UNIT - II ENTREPRENEURIAL ENVIRONMENT   **9**

Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organizational Services - Central and State Government Industrial Policies and Regulations.

UNIT - III BUSINESS PLAN PREPARATION   **9**

Sources of Product for Business - Prefeasibility Study - Criteria for Selection of Product - Ownership-Capital Budgeting- Project Profile Preparation - Matching Entrepreneur with the Project - Feasibility Report Preparation and Evaluation Criteria.

UNIT- IV LAUNCHING OF SMALL BUSINESS   **9**

Finance and Human Resource Mobilization - Operations Planning - Market and Channel Selection -Growth Strategies-Product Launching-Incubation, Venture capital, Start-ups.

UNIT - V MANAGEMENT OF SMALL BUSINESS   **9**

Monitoring and Evaluation of Business-Business Sickness-Prevention and Rehabilitation of Business Units-Effective Management of small Business-Case Studies.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Realize entrepreneurial competence to run the business efficiently.
CO2 : Assess the process of businesses in the entrepreneurial environment
CO3 : Prepare business plans and undertake feasible projects.
CO4 : Develop their business ventures successfully
CO5 : Monitor the business effectively towards growth and development.

REFERENCES:

1. S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi, 2016.
2. R.D.Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2018.
3. Rajeev Roy, Entrepreneurship, Oxford University Press, 2nd Edition, 2011.
4. Donald F Kuratko,T.V Rao. Entrepreneurship: A South Asian perspective. Cengage Learning, 2012.
5. Dr. Vasant Desai, "Small Scale Industries and Entrepreneurship", HPH, 2006.
6. Arya Kumar. Entrepreneurship, Pearson, 2012.
7. Prasanna Chandra, Projects-Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill, 8th edition, 2017.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAE09-ENTREPRENEURSHIP DEVELOPMENT	CO1	-	-	-	-	2	1	3	3	-	2	3
	CO2	-	-	-	-	2	2	3	3	-	1	3
	CO3	-	-	-	-	2	1	3	3	-	1	3
	CO4	-	-	-	-	2	1	3	3	-	1	3
	CO5	-	-	-	-	2	1	3	3	-	2	3
Average		-	-	-	-	2.00	1.20	3.00	3.00	-	1.40	3.00

PROFESSIONAL ELECTIVE LAB – II COURSES

L T P C

0 0 4 2

222CAL01 – MACHINE LEARNING TECHNIQUES LAB

BASIC PREREQUISITES:
- Fundamental Concept of Python Programming
- Basic functionalities of Scripting Language
- Concept of OOPs

COURSE OBJECTIVES:
- Knowledge and skills to implement classifiers for analyzing and categorizing sales data
- To Gain Knowledge about Implement the FIND-S algorithm.
- To equip the knowledge and practical skills to implement decision tree algorithms
- Knowledge to apply clustering algorithms in data analysis for detecting insurance fraud and identifying cancerous data
- Ability to develop a game and traffic control system using reinforcement learning.

LIST OF EXPERIMENTS

1. Implement a classifier for the sales data.

2. Develop a predictive model for predicting house prices

3. Implement the FIND-S algorithm. Verify that it successfully produces the trace in for the Enjoy sport example.(Tom Mitchell Reference)

4. Implement a decision tree algorithm for sales prediction/classification in retail sector

5. Implement back propagation algorithm for stock prices prediction

6. Implement clustering algorithm for Insurance fraud detection

7. Implement clustering algorithm for identifying cancerous data

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

9. Develop a traffic signal control system using reinforcement learning technique.

Total No. of Periods: 60

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1: Create and evaluate classifiers that categorize sales data effectively to identify patterns and trends.
CO2: Implement the FIND-S algorithm in programming.
CO3: Apply decision tree algorithms to predict and classify sales data in the retail sector
CO4: Analyze and segment data for detecting patterns indicative of insurance fraud
CO5: Apply reinforcement learning to design and develop their own games.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAL01 – MACHINE LEARNING TECHNIQUES LAB	CO1	3	3	3	3	2	1	1	3	3	3	-
	CO2	3	3	3	3	2	1	1	3	3	3	-
	CO3	3	3	3	3	3	2	2	3	3	3	1
	CO4	3	3	3	3	3	2	2	3	3	3	2
	CO5	3	3	3	3	3	2	2	3	3	3	2
Average		3.00	3.00	3.00	3.00	2.60	1.60	1.60	3.00	3.00	3.00	1.60

222CAL02- FULL STACK WEB DEVELOPMENT LAB

BASIC PREREQUISITES:
- Idea about HTML, CSS and JavaScript
- Fundamental of OOP Concepts
- Basic Functionalities of Non-Tabular data

COURSE OBJECTIVES:
- To understand the types of PHP array and functions
- To learn the concepts GET / POST of form handling.
- To Process a web application using NodeJS and Express.
- To implement a SPA using React.
- To Process a full stack single page application using React, NodeJS, and a Database (MongoDB or SQL).

LIST OF EXPERIMENTS:

1. Implement

    a. Array Types

    b. String function

    c. Date function

    d. User Defined function.

2. Design a User Registration Form and display the user information in another form (Use GET/POST).
3. Design any simple Web Application using PHP and MYSQL.
4. Set Cookies and Retrieve the same in another page.
5. Create a NodeJS server using Express that stores data from a form as a JSON file and displays it in another page. The redirect page should be prepared using Handlebars.
6. Create a NodeJS server using Express that creates, reads, updates and deletes students' details and stores them in MongoDB database. The information about the user should be obtained from a HTML form.
7. Create a NodeJS server that creates, reads, updates and deletes event details and stores them in a MySQL database. The information about the user should be obtained from a HTML form.
8. Create a counter using ReactJS.
9. Create a Todo application using ReactJS. Store the data to a JSON file using a simple NodeJS server and retrieve the information from the same during page reloads.
10. Create a simple Sign up and Login mechanism and authenticate the user using cookies. The user information can be stored in either MongoDB or MySQL and the server should be built using NodeJS and Express Framework.

Total No. of Periods: 60

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Create a simple application with basic concepts of PHP.
CO2 : Execute an application using Form with MySQL
CO3 : Deploy server side applications using NodeJS.
CO4 : Implement and architect database systems in both NoSQL and SQL environments.
CO5 : Design and Develop a single page application using React JS and NodeJS.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAL02- FULL STACK WEB DEVELOPMENT LAB	CO1	3	3	3	3	-	-	-	-	3	3	-
	CO2	3	3	3	3	-	-	-	-	3	3	-
	CO3	3	3	3	3	3	-	2	3	3	3	2
	CO4	3	3	3	3	3	3	3	3	3	3	3
	CO5	3	3	3	3	3	3	2	3	3	3	3
Average		3.00	3.00	3.00	3.00	3.00	3.00	2.33	3.00	3.00	3.00	2.67

222CAL03 - C# AND DOT NET PROGRAMMING LAB

BASIC PREREQUISITES:
- Fundamental of Procedure Programming in C
- Basic concept of OOPs in C++

COURSE OBJECTIVES:

- Teach students the fundamental concepts of programming, including the use of branching and looping structures, as well as methods, arrays, and strings.
- Equip students with advanced programming concepts, focusing on object-oriented programming (OOP) features
- Students to advanced programming concepts, particularly the use of lambda expressions for designing simple applications.
- Provide students with the knowledge and skills to design and develop window-based applications using delegates and events.
- Teach students how to design and develop window applications using ADO.NET for data management

LIST OF EXPERIMENTS

1. Programs using Branching, and Looping.
2. Programs using Methods, Arrays, and Strings.
3. Programs using Inheritance.
4. Programs using Delegates, Events, Errors and Exceptions.
5. Program to Build a Calculator Widget.
6. Design a simple application based on LAMDA Expression
7. Design and develop any window application using Delegates.
8. Design and Deploy a MDI Application using Events
9. Implement ADO.Net Window applications
10. Design and develop user and custom control in ASP.Net

Total No. of Periods: 60

COURSE OUTCOMES:
At the end of course, the Student will be able to:

CO1 : Execute a simple program using branching and looping structures.
CO2 : Implement programs that utilize inheritance to promote code reuse and extend functionalities
CO3 : Design simple applications using lambda expressions.
CO4 : Develop a window application using delegates to handle events efficiently
CO5 : Design and Deploy an application using ADO.NET

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAL03 - C# AND DOT NET PROGRAMMING LAB	CO1	3	3	3	3	1	1	2	3	3	2	-
	CO2	3	3	3	3	1	1	2	3	3	2	-
	CO3	3	3	3	3	1	1	3	3	3	2	-
	CO4	3	3	3	3	2	1	3	3	3	2	2
	CO5	3	3	3	3	2	1	3	3	3	2	2
Average		3.00	3.00	3.00	3.00	1.40	1.00	2.00	3.00	3.00	1.00	2.00

220CAL04 - DATA MINING AND DATA WAREHOUSING LAB

BASIC PREREQUISITES:
- Concept of Database Management System
- Knowledge in Python Programming

COURSE OBJECTIVES:

- Practical experience in performing data pre-processing tasks for data mining using WEKA.
- Learn the principles and techniques of frequent pattern mining using FP-Growth and Apriori algorithms.
- Gain fundamental Knowledge in data analysis techniques in machine learning, focusing on clustering algorithms and Naïve Bayes classification
- Understanding of classification and regression techniques in machine learning
- To Learn the Process and functionalities of data warehousing concepts and techniques.

LIST OF EXPERIMENTS

1. Performing data pre-processing tasks for data mining in WEKA.
2. Implement the algorithm to generate a decision tree and convert it into "if –then – else rules"
3. Implement FP-Growth and Apriori algorithm.
4. Implement association rule mining.
5. Implement clustering algorithms
6. Implement Naïve Bayes classification.
7. Implement K- nearest neighbour classification
8. Implement Linear Regression
9. Implement defining subject area, design of fact dimension table.
10. Implement OLAP, roll up, drill down, slice and dice operation.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:
- **CO1:** Perform data pre-processing tasks in WEKA
- **CO2:** Analyze both the FP-Growth and Apriori algorithms to find frequent item sets in data and generate association rules.
- **CO3:** Apply various clustering algorithms to group data into meaningful clusters based on similarities
- **CO4:** To implement K-Nearest Neighbor (K-NN) classification to classify data based on proximity to data points in a feature space
- **CO5:** Demonstrates their ability to organize data for effective analysis and to derive insights from complex datasets.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
220CAL04 - DATA MINING AND DATA WAREHOUSING LAB	CO1	3	3	3	3	-	1	-	2	3	2	-
	CO2	3	3	3	3	-	1	-	2	3	2	-
	CO3	3	3	3	3	2	1	1	2	3	2	-
	CO4	3	3	3	3	2	1	1	2	3	2	2
	CO5	3	3	3	3	2	1	1	2	3	2	2
Average		3.00	3.00	3.00	3.00	2.00	1.00	1.00	2.00	3.00	2.00	2.00

222CAL05- CLOUD COMPUTING LAB

BASIC PREREQUISITES:
- Basic concept of Virtual Box
- Idea about Client Server Technology.
- Fundamental concept of online cloud platform.

COURSE OBJECTIVES:

- Provide students with practical knowledge and experience in setting up virtual machines on a Windows operating system using virtualization software
- Gain knowledge and skills needed to install and configure Google App Engine.
- Provide students with the ability to simulate a cloud computing environment using CloudSim Practice Schedule algorithm
- Introduce students to practical methods for managing virtual machines (VMs)
- Experience in installing and configuring a single-node Hadoop cluster

LIST OF EXPERIMENTS

1. Install Virtual Box / VMare Workstation with different Platform

2. Install a C Compile r in the virtual machine created using virtual box and executed a simple program.
3. Install Google App Engine. Create a Hello World app and other simple application using python / Java
4. Use GAE Launcher to launch the web applications.

5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6. Find a procedure to transfer the file from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack (Online OpenStack Demo Version)
8. Install Hadoop single node cluster and run simple application like word count.

Total No. of Periods :45

COURSE OUTCOMES:

At the end of course, the Student will be able to:
- **CO1 :** Install and configure a C compiler in a virtual machine running a guest operating system, and execute simple C programs.
- **CO2 :** Develop and deploy simple web applications using Google App Engine.
- **CO3 :** Simulate a cloud scenario using CloudSim and design, implement, and test a scheduling algorithm
- **CO4 :** Analyze the transfer files between virtual machines using various methods and launch virtual machines using the TryStack platform.
- **CO5 :** Build and Deploy a single-node Hadoop cluster and execute basic Hadoop applications such as WordCount..

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAL05-CLOUD COMPUTING LAB	CO1	-	-	3	3	1	1	1	2	3	2	-
	CO2	-	-	3	3	1	1	1	2	3	2	-
	CO3	-	-	3	3	2	1	2	2	3	2	-
	CO4	-	-	3	3	2	1	3	3	3	2	3
	CO5	2	2	3	3	2	1	3	3	3	2	3
Average		2.00	2.00	3.00	3.00	1.60	1.00	2.00	2.40	3.00	2.00	3.00

222CAL06 - EXECUTIVE COMMUNICATION LAB

BASIC PREREQUISITES:

- Basic Concept of Communication Skills
- Idea about Active Listening

COURSE OBJECTIVES:

- Understand concept of soft skills such as communication, teamwork, problem-solving, adaptability, and emotional intelligence.
- To develop students' listening and reading comprehension skills by exposing them to various linguistic elements
- Emphasizes the importance of non-verbal communication and body language to enhance overall presentation effectiveness.
- To equip the skills necessary to excel in group discussions, personal interviews, resume writing, and letter writing.
- To prepare clear, well-structured, and professionally presented reports

SOFT SKILLS

Team Skills :

Team building and leadership - Evolution of groups into teams - Group dynamics - Emergence of leadership - Intra-group dynamics - Inter-group dynamics - Stress management - Inter dependency - Assessment of team-based projects

Time Management:

Goal setting - Effective time management

Interpersonal Skills:

Negotiations - Conflict management - Social skills - Assertive skills - Cross-cultural communications

Leadership Skills:

Concepts of leadership - Leadership styles - Insights from great leaders

Listening:

Scientific lectures - Educational videos - Gap filling exercises - Presentations - Formal Job interviews - Debates - Panel discussions - INK talks

Speaking:

Narrating personal experiences - Presentation - Group discussion - Simulations - Find the difference - Giving and asking for directions - News brief - Extempore/Impromptu

Reading:

Brochures - Social media messages - Newspaper - Editorials - Case studies - Critical reviews - Excerpts of interview with professionals - Technical texts

Writing:

Résumé - Letter writing - E-mail etiquettes - Report - Developing hints - Note-making - Note-taking

Grammar:

Concord - Error correction - Editing - Verbal analogy - Arranging sentences

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Demonstrate strong soft skills, including effective communication, active listening, collaboration, adaptability, and conflict resolution

CO2 : comprehend spoken language effectively

CO3 : Design and deliver compelling presentations tailored to their audience

CO4 : Participate in group discussions and personal interviews, demonstrating strong communication, critical thinking, and interpersonal skills.

CO5 : Create a detail and organize reports tailored to their audience

REFERENCES:

1. Andrea J. Rutherford, "Basic Communication Skills for Technology", 1st Edition, Pearson Education Asia (Singapore) Pvt. Ltd., Bangalore, 2001.
2. Bhatia R.C., "Business Communication", Ane Books India, New Delhi, 2008.
3. Raman, Meenakshi and Sangeetha Sharma, "Technical Communication – English Skills for Engineers", 2nd Edition. Oxford University Press, New Delhi, 2009.
4. Ashraf M Rizvi, "Effective Technical Communication", 5th Edition, The McGraw-Hill PublishingCompany Ltd., New Delhi, 2007.
5. Mohan Krishna Banerjee Developing Communications Skills Macmillan India Ltd. 2009.
6. R S Aggarwal , "Objective English" , Macmillan India Ltd. 2007.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAL06 - EXECUTIVE COMMUNICATION LAB	CO1	-	-	-	-	3	-	3	3	-	3	3
	CO2	-	-	-	-	3	-	3	3	-	3	3
	CO3	-	-	-	-	3	-	3	3	-	3	3
	CO4	-	-	-	-	3	-	3	3	-	3	3
	CO5	-	-	-	-	3	-	3	3	-	3	3
Average		-	-	-	-	3.00	-	3.00	3.00	-	3.00	3.00

222CAL07 - REPORT WRITING LAB

BASIC PREREQUISITES:
- Fundamental concepts of Ms Office Packages
- Basic functionalities of DBMS
- Concept of Research Methodology.

COURSE OBJECTIVES:
- To create professional reports using both MS Word and LaTeX.
- To introduce students to various open source report writing tools
- To guide in preparing comprehensive and structured reports for application projects
- To Learn and design reports with structured and informative headers, accurate and well-organized body content, and coherent footers that provide necessary information and references
- To guide the process of writing a comprehensive thesis by teaching them how to structure and organize a thesis from the introduction to the conclusion

LIST OF EXPERIMENTS

1. Use of MS Word and Latex for report preparation.
2. Use of Excel for graphs
3. Use of report writing tools – Oracle Report Builder, Crystal Reports – Visual Basic
4. Report Writing for an application project on any one of the following;
   - Student Information System
   - Banking Operation
   - Admission System
   - Railway reservation System
5. Header, Body computation and Footer generation for Reports.
6. Thesis writing:
   - Introduction on Problems
   - Literature survey – Existing work
   - Architecture Design
   - Algorithms and Implementation
   - Presentation and results
   - Writing Conclusion
   - Display of Reference

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Utilize MS Word and LaTeX to prepare well-structured, clear, and visually appealing reports tailored to their audience and purpose.

CO2 : Assess open source report writing tools efficiently to create clear, well-organized, and visually appealing reports

CO3 : Generate a detailed report for application projects, providing clear descriptions of system functionality, design, and implementation

CO4 : Create professional reports with properly formatted headers, footers, and body content

CO5 : Provide a structured and well-organized thesis, presenting a clear introduction to problem

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAL07 - REPORT WRITING LAB	CO1	-	3	1	2	1	-	3	2	1	2	1
	CO2	3	3	2	2	1	-	2	3	3	3	-
	CO3	2	3	2	2	1	-	2	3	3	3	-
	CO4	-	-	-	-	1	1	2	3	-	-	1
	CO5	-	-	-	-	1	1	3	3	-	-	3
Average		2.50	3.00	1.60	2.00	1.00	1.00	2.40	2.80	2.30	2.60	1.60

BRIDGE COURSES

222CAB01 - FUNDAMENTALS OF COMPUTING AND PROGRAMMING -II

COURSE OBJECTIVES:

- Understand the core principles and concepts of database management systems (DBMS), including data modelling, normalization, and indexing.
- Understanding of query processing techniques in database management systems (DBMS)
- Acquire proficiency in HTML (Hypertext Markup Language) coding fundamentals, including understanding the structure, syntax, and semantic elements used to create web pages
- Gain comprehensive knowledge of Human Resource Management (HRM) principles, practices, and strategies.
- Develop a solid foundation in statistical theory and methods, including descriptive statistics, probability theory, hypothesis testing, and regression analysis.

UNIT-I   DATABASE MANAGEMENT SYSTEM   9

Database System vs File System – View of Data – Data Models- Database Languages Transaction Management – Database Systems Structure- History of Database Systems- Entity Relationship Model.

UNIT- II   QUERY PROCESSING SQL   9

Basic Structure – Set Operations – Complex Queries – Joined Queries – DDL Embedded SQL- Dynamic SQL – Other SQL Functions – Query by Example – Integrity and Security of Searching – Relational Data Base Design.

UNIT- III   HTML INTRODUCTION   9

Basic tags – elements – attributes – phrase tags – meta tags – Commends tag – formatting – images – tables – list – forms – embedded with multimedia – div tag – CSS – inline – embedded – external.

UNIT- IV   HUMAN RESOURCE MANAGEMENT   9

Introduction to management function: Human Resource Development – selection & training, Marketing Management- Concept, Scope and four components i.e. product, Price, Place and Promotion, Manufacturing Management: - Production System, Production Planning and Control, Strategic Planning.

UNIT- V   STATISTICS   9

Statistics methods- Sampling, Population, Sample and Sample size, Methods of Sampling, Time series analysis, Hypotheses, Procedure of testing of hypothesis, Test of Significance, Chi Square test 'Z' test and T-Test.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

- **CO1:** Assess a relational database schema based on given requirements.
- **CO2:** Analyze and optimize SQL queries for efficiency and performance
- **CO3:** Design and develop static web pages using HTM
- **CO4:** Analyze organizational HR needs and develop effective HRM strategies aligned with business objectives.
- **CO5:** Apply appropriate statistical techniques to analyses data sets, interpret results, and draw meaningful conclusions.

REFERENCES:

1. Morris Mano, "Digital Logic & Computer Design" PHI 2017.
2. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. R.Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education Addison Wesley, 2007.
4. M.Morris Mano," Computer System Architecture", Prentice Hall of India, 3rd edition, 2005
5. Mirza S. Saiyadain "Human Resources Management" Tata McGraw –Hill, 4th Edition, 2009.
6. Sarah Gilmore & Steve Williams "Human Resource Management" Oxford University Press, 2010.
7. Kandasamy.P,Thilagavathy,K.,&Gunavathi.K., "Probability, Statistics and Queueing Theory"., S.Chand& Company Ltd., New Delhi. 8. Miller and Freund., "Probability and Statistics for Engineers", Pearson Education, Asia, 7th edition.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAB01 - FUNDAMENTALS OF COMPUTING AND PROGRAMMING -II	CO1	3	3	3	3	1	-	1	3	3	3	-
	CO2	3	3	3	3	1	-	1	3	3	3	-
	CO3	3	3	3	3	1	-	1	3	3	2	-
	CO4	-	-	-	-	2	3	3	2	-	2	3
	CO5	3	3	3	3	1	2	2	2	3	-	-
Average		3.00	3.00	3.00	3.00	1.20	2.5	1.60	2.60	.00	2.50	3.00

222CBP01 - FUNDAMENTALS OF COMPUTING AND PROGRAMMING LAB – II

COURSE OBJECTIVES:

- To enable to execute single command line instructions effectively for table manipulation in databases.
- To familiarize the concepts and syntax of executing group functions for table analysis in databases.
- To educate on the fundamentals and practical applications of Data Control Language (DCL) and Data Manipulation Language (DML) commands in database management systems
- Knowledge and skills necessary to design a simple webpage using HTML forms and DIV tags with CSS for layout structuring and styling
- Principles and techniques of designing a simple webpage using HTML's TABLE element

LIST OF EXPERIMENTS

1. Execute single commend line for table

2. Execute group function for a table

3. DCL Commands

4. DML Commands

5. Create and manipulate a various Complex Queries

6. Design a simple webpage using forms in HTML

7. Design a simple webpage using DIV tag with CSS.

8. Design a simple webpage using TABLE tab in HTML

COURSE OUTCOMES:

At the end of course, the Student will be able to:
CO1: Execute single command line operations to create, modify, and query tables within a database system.
CO2: Demonstrate the ability to effectively utilize group functions to aggregate and analyze data within tables
CO3: Proficient in utilizing DCL commands to manage user permissions and security
CO4: Capable of creating well-structured webpages incorporating HTML forms for user input and DIV tags styled with CSS for layout design
CO5: Design and develop basic web interfaces with tabular layouts that effectively present information in a clear and organized manner

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CBP01 - FUNDAMENTALS OF COMPUTING AND PROGRAMMING LAB – II	CO1	3	3	3	3	1		2	2	3	3	-
	CO2	3	2	3	3	1		2	1	3	3	-
	CO3	3	3	3	3	1		2	1	3	3	1
	CO4	3	3	3	3	2	1	2	3	3	3	2
	CO5	3	3	3	3	2	1	2	3	3	3	2
Average		3.00	2.8	3.00	3.00	1.40	1.00	2.00	2.00	3.00	3.00	1.60

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222CAE10- WASTE TO ENERGY

COURSE OBJECTIVES:

- To learn fundamental and practical aspects for the treatment and simultaneous valorization of waste (including wastewater) toward energy generation
- To enable students to understand of the concept of Waste to Energy.
- To link legal, technical and management principles for production of energy form waste.
- To learn about the best available technologies for waste to energy.
- To analyze of case studies for understanding success and failures.

UNIT-I INTRODUCTION TO ENERGY FROM WASTE   9

Classification of waste as fuel – Agro based, Forestresidue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

UNIT-II BIOMASS PYROLYSIS   9

Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

UNIT-III BIOMASS GASIFICATION   9

Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

UNIT-IV BIOMASS COMBUSTION   9

Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

UNIT-V BIOGAS   9

Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features – Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Awareness of global energy scenarios

CO2 : Apply the context of environmental protection and sustainability

CO3 : Develop skills on main principles of chemical and biotechnological waste-to energy processes

CO4 : Analyze the advantages of waste-to-energy conversion and their difficulties to be implemented

CO5 : Apply tools for the techno-economic analysis of the studied processes

REFERENCES:

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAE10- WASTE TO ENERGY	CO1	-	-	-	-	1	-	3	3	-	1	3
	CO2	-	-	-	-	1	-	3	3	-	1	3
	CO3	-	-	-	-	1	-	3	3	-	1	3
	CO4	-	-	-	-	1	-	3	3	-	1	3
	CO5	-	-	-	-	1	-	3	3	-	1	3
Average		-	-	-	-	1.00	-	3.00	3.00	-	1.00	3.00

222CAE11- FUNDAMENTALS LAWS AND ETHICS

COURSE OBJECTIVES:

- To gain basic knowledge in Laws and Ethics to understand the concepts of regulatory compliance, requirements.
- Desired ethics expected from professionals.
- Acquire adequate knowledge of the basic concepts of laws
- Understand the basic knowledge of ethics including allied regulatory compliance and requirements
- To understand the fundamental of Ethics

UNIT - I   FUNDAMENTALS OF COMMERCIAL LAWS   9

Laws of Contracts-Essential elements of a contract, offer and acceptance-Void and voidable agreements-Consideration, legality of object and consideration-Capacity of Parties, free consent-Quasi-contracts, contingent contracts, termination or discharge of contracts-Laws relating to Sale of Goods-Definition-Transfer of ownership-Performance of the Contract of Sale

UNIT- II   NEGOTIABLE INSTRUMENTS ACT & INDIAN PARTNERSHIP ACT   9

Negotiable Instruments Act,1881-Acceptance and negotiation -Rights and liabilities of Parties-Dishonour of a Negotiable Instrument-Hundis-Bankers and Customers-Indian Partnership Act,1932-Nature of Partnership-Rights and liabilities of Partners -Dissolution of Firms

UNIT – III   FUNDAMENTALS OF INDUSTRIAL LAWS   9

Factories Act,1948-Objective, Scope-Applicability of Factories Act,1948-Payment of Wages Act, 1936 and Minimum Wages Act, 1948-Objective, Scope-Applicability of Payment of Wages Act, 1936 and Minimum Wages Act, 1948-The Employees' State Insurance Act, 1948-Objective, Scope-Applicability of ESI Act, 1948

UNIT- IV   THE CHILD LABOUR (PROHIBITION AND REGULATION) ACT   9

The Child Labour (Prohibition and Regulation) Act, 1986 – Concepts and Definition
Prohibition of Children in certain Occupations and Processes (Sec 3) -Regulation of Conditions of Works of Children -Penalties (Section 14) -Power of Central / Appropriate Government Where to make a Complaint -Prohibited Occupations -Prohibited Processes.

UNIT –V   FUNDAMENTALS OF ETHICS   9

Ethics – meaning, importance- The Seven Principles of Public Life –selflessness, integrity, objectivity, accountability, openness, honesty and leadership-The relationship between Ethics and Law

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Apply the basic concepts and terminology of the law of contract.
CO2 : Analyze the various processes involved in contract formation
CO3 : Demonstrate ethical awareness, the ability to do ethical reflection, and the ability to apply ethical principles in decision-making.
CO4 : Developing a student's ethical awareness, reflection, and decision-making ability is central to a Core Curriculum.
CO5 : Analyze the process of Fundamental Ethics.

REFERENCES:

1. Barrett, Edward F., "The Adversary System and the Ethics of Advocacy," Notre Dame Lawyer 37: 479–88 (1962).
2. Alexy, Robert, The Argument from Injustice (Oxford: Oxford University Press, Paulson, Bonnie Litschewski and Paulson, Stanley L., trans. 2002).
3. Amsterdam, Anthony, and Bruner, Jerome, Minding the Law (Cambridge, Mass.: Harvard University Press 2000).

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
222CAE11-FUNDAMENTALS LAWS AND ETHICS	CO1	-	-	-	-	-	-	3	1	1	3	2
	CO2	-	-	-	-	-	-	3	1	1	3	3
	CO3	-	-	-	-	-	-	3	1	1	3	3
	CO4	-	-	-	-	-	-	3	1	1	3	3
	CO5	-	-	-	-	-	-	3	1	1	3	3
Average		-	-	-	-	-	-	3.00	1.00	1.00	3.00	3.00

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322CAT01 – MOBILE APPLICATION DEVELOPMENT

BASIC PREREQUISITES:

- Basic knowledge in Java
- Knowledge in Database

COURSE OBJECTIVES:

- To understand the concept of ADT, Various UI, and the anatomy of applications.
- To learn the functionalities of Activities, Intents, and Components
- To Know the role of Views and Data Persistence
- To Build an Application with flutter
- To understand the fundamental concept of Objective – C using XCode

UNIT - I INTRODUCTION 9

Introduction to Android- Features of Android – Architecture of Android –Eclipse- Android SDK – Android Development tool(ADT) – Creating Android Virtual Devices- Creating your first application- Anatomy of an application – Generic UI Development – Multimodal and Multi UI Channel – Gesture Based UI

UNIT - II ACTIVITIES, INTENTS and COMPONENTS 9

Understanding Activities: Applying Style and Themes to Activity- Displaying a Dialog Window-Displaying a Progress Window-Linking Activities Using Intents – Calling Built-in Application using Intents- Understanding the component of a screen- Adapting to display orientation-Managing changes to screen orientation – location based services.

UNIT - III VIEWS AND DATA PERSISTENCE 9

Basic Views- Picker Views- List Views – Using Images Views to Display Pictures – Using Menus with Views – Some Analog View: Analog Clock View-Digital Clock View –Web View-Saving and Loading User Preferences – Persisting Data to Files – Creating and Using Databases: insert, delete, update, search database –Building the database with applications – android services – MVC framework.

UNIT – IV FLUTTER 9

Introduction – Architecture- Android Setup for Flutter Development- Flutter Widgets – Flutter UI Components – Flutter Design and Animation – Flutter Forms and Gesture – Flutter Navigation and Routing – Simple Flutter Applications.

Getting the Tools - iOS Project: Anatomy of an iOS App, XCode IDE- Debugging iOS App – iOS simulator – Debugging Code – Instruments - Objective C Basics – Simple App Development – Building the Derby App in iOS – Other Useful iOS things – offline storage - GPS.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Create a simple mobile application based on the anatomy of android.
CO2 : Design android application using activities, intent, and components
CO3 : Execute a simple application using View and Persistence
CO4 : Design and Build Flutter based Android Application
CO5 : Develop a simple iOS application using Objective – C using Xcode

REFERENCES:

1. Sujit Kumar Mishra,"Fundamentals of Android App Development Android Development for Beginners to Learn Android Technology, SQLite, Firebase and Unity"-Bpb Publications,2020.
2. Wei-Meng Lee, "Beginning Android Application Development", Wiley 2011
3. Jeff Mc Wherter and Scott Gowell, "Professional Mobile Application Development", Wrox 2012.
4. Paul Deitel, Harvey Deitel, Abbey Deitel and Michael Morgany, "Android for Programmers an App-Driven Approach", Pearson 2012.
5. Reto Meier, "Professional Android 4 Application Development", Wiley 2019. Alessandro Biessek, Flutter for Beginners
6. An Introductory Guide to Building Cross-platform Mobile Applications with Flutter and Dart 2"- Packt Publishing-2019.
7. Marco L. Napoli,"Beginning Flutter A Hands-On Guide to App Development", Wiley,2019

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAT01 – MOBILE APPLICATION DEVELOPMENT	CO1	3	3	3	3	-	-	3	2	3	3	-
	CO2	3	3	3	3	3	-	3	1	3	3	-
	CO3	3	3	3	3	-	-	3	3	3	3	2
	CO4	3	3	3	3	3	-	3	3	3	3	3
	CO5	3	3	3	3	2	-	2	3	2	3	2
Average		3.00	3.00	3.00	3.00	2.67	-	2.80	2.40	2.80	3.00	2.33

322CAT02 - DEVOPS

BASIC PREREQUISITES:

- Basic knowledge in Software development life cycle.
- Knowledge in Database

COURSE OBJECTIVES:

- Understand fundamental concepts of DevOps
- To compile and build using Maven and Gradle
- To gain knowledge in Continuous Integration using Jenkins.
- To understand the microservices in DevOps environments.
- To remember the process of velocity and continuous delivery

UNIT - I DEVOPS TOOLS   9

History of DevOps- DevOps and Software Development Life Cycle – Waterfall Model - Agile Model – DevOps Life Cycle – DevOps Tools: distributed version of control tool Git- Automation testing tools Selenium – report generation –Test NG – User Acceptance Testing – Jenkins

UNIT - II COMPILE AND BUILD USING MAVEN & GRADLE   9

Introduction, Installation of Maven, POM files, Maven Build lifecycle, Build phases (compile build, test, package) Maven Profiles, Maven repositories (local, central, global), Maven plugins, Maven create and build Artifacts, Dependency management, Installation of Gradle, understand build using Gradle

UNIT - III CONTINUOUS INTEGRATION USING JENKINS   9

Install & Configure Jenkins, Jenkins Architecture Overview, Creating a Jenkins Job, Configuring a Jenkins job, Introduction to Plugins, Adding Plugins to Jenkins, Commonly used plugins (Git Plugin, Parameter Plugin, HTML Publisher, Copy Artifact and Extended choice parameters). Configuring Jenkins to work with java, Git and Maven, Creating a Jenkins Build and Jenkins workspace.

UNIT - IV MICROSERVICES IN DEVOPS ENVIRONMENT   9

Evolution of Microservices and DevOps – Benefits of combining DevOps and Microservices- working of DevOps and Microservices in Cloud environment - DevOps Pipeline representation for a NodeJS-based Microservices

Velocity - Delivery Pipeline- test stack - Small/Unit Test – Medium/integration testing – System testing- Job of Development and DevOps - Job of Test and DevOps – Job of Op and Devops Infrastructure and the job of Ops

Total No. of Periods: 45

COURSE OUTCOMES:
At the end of course, the Student will be able to:
  CO1 : Assess and monitor the Devops Tools
  CO2 : Build Marven and Gradle Tools
  CO3 : Develop and maintain simple application using Jenkins
  CO4 : Analyze the Microservices in Devops Environments
  CO5 : Design and develop application using DevOps Tools

REFERENCES:

1. Namit Tanasseri, RahulRai, Microservices with Azure, 1st Edition, Packt Publishing, UK, 2017
2. Eberhard Wolff, Microservices: Flexible Software Architecture, 1st Edition, Pearson Education, 2017
3. James A Scott, A Practical Guide to Microservices and Containers, MapR Data Technologies e – book. https://mapr.com/ebook/microservices-and-containers/assets/microservices-andcontainers.pdf
4. Joyner Joseph, Devops for Beginners, First Edition, MihailsKonoplovs publisher, 2015.
5. Gene Kim, Kevin Behr, George Spafford, The Phoenix Project, A Novel about IT, DevOps, 5th Edition, IT Revolution Press, 2018.
6. Michael Hüttermann, DevOps for Developers, 1st Edition, APress, e-book, 2012.
7. Mariot Tsitoara, "Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer", Second Edition, 2019.
8. Mitesh Joni, "Hands-On Azure Devops: Cicd Implementation for Mobile, Hybrid, And Web Applications Using Azure Devops and Microsoft Azure: CICD Implementation for DevOps and Microsoft Azure (English Edition)" Paperback – 1 January 2020

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAT02 - DEVOPS	CO1	3	3	3	3				2	3	2	
	CO2	3	3	3	3		3		2	3	2	
	CO3	3	3	3	3		3	2	3	3	2	2
	CO4	3	3	3	3	3	3	3	3	3	2	2
	CO5	3	3	3	3	3		3	3	3	2	2
Average		3.00	3.00	3.00	3.00	3.00	3.00	2.67	2.60	3.00	2.00	2.00

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322CAT03 - SERVICE ORIENTED ARCHITECTURE

BASIC PREREQUISITES:

- Knowledge in HTML / Java programming / Computer Network

COURSE OBJECTIVES:

- To understand the fundamental concepts XML.
- To learn the basic Concept of Service Oriented Architecture.
- To identify the service oriented analysis and design.
- To learn the importance of SOA Platforms.
- To Understand and use Spring Data and Spring Boot's support for it.

UNIT – I XML FUNDAMENTALS 9

XML – structuring with schema DTD – XML Schema – XML Processing DOM – SAX – Present XSL – Transformation XSLT – XPath – XQuery – XML Security and meta framework.

UNIT – II INTRODUCTION TO SOA 9

Roots of SOA – Characteristics of SOA – Anatomy of SOA – How components in an SOA interrelate – Principles of service orientation Messaging with SOAP – Message exchange Patterns – Coordination – Atomic Transactions– Business activities – Orchestration – Choreography – Service layer abstraction – Application Service Layer – Business Service Layer.

UNIT - III SERVICE ORIENTED ANALYSIS AND DESIGN 9

Service oriented analysis – Business-centric SOA–Deriving business services-service modelling –Service Oriented Design – WSDL basics–SOAP basics – SOA composition guidelines –Entity-centric business service design – Application service design – Task centric business service design.

UNIT - IV SOA PLATFORMS 9

SOA platform basics – SOA support in J2EE – Java API for XML based web services (JAX-WS) – Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) – Java API for XML based RPC (JAX-RPC) - Web Services Interoperability Technologies (WSIT) – JAX-RS SOA support in .NET – ASP.NET web services.

Spring Boot: Introduction - DevTools and Actuator - Application Properties - Running Spring Boot Apps from command line - Spring Security: Introduction and Overview - Form Login with Database - TagsLib - OAuth2 with JWT.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Examine the fundamental concept of XML.

CO2 : Assess the knowledge of Service Oriented Architecture.

CO3 : Analyze and Design principle of Service Oriented Architecture.

CO4 : Experience SOA Platform support in J2EE

CO5 : Developing Spring applications using Spring Boot.

REFERENCES:

1. Craig Walls," Spring in Action", 6th Edition, Manning Publications, 2022.
2. Kirti seth, Ashish Seth, **"**Understanding Service-Oriented Architecture**"**, BPB Publications, 2020.
3. Mick Knutson, Robert Winch, Peter Mularien," Spring Security", 3rd Edition, Packt Publisher, 2017.
4. Thomas Erl**, "**Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2016.
5. Thomas Erl, "SOA Principles of Service Design ", Prentice Hall Service, 2008.
6. Ron Schmelzer et al. "XML and Web Services", Pearson Education, 2008.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAT03 - SERVICE ORIENTED ARCHITECTURE	CO1	2	3	3	3	-	-	3	3	3	2	-
	CO2	2	3	3	3	-	-	3	3	3	2	-
	CO3	-	3	3	3	2	-	3	3	3	2	3
	CO4	2	3	3	2	2	3	3	3	3	2	3
	CO5	3	3	2	2	2	3	3	3	3	2	3
Average		2.25	3.00	2.80	2.60	2.00	3.00	3.00	3.00	3.00	2.00	3.00

322CAP01 – MINIPROJECT

Course Objectives:

- Learn theoretical knowledge and practical skills acquired during their academic studies to a real-world project.
- Understand the required data to make effective applications.
- Gain the technical skills specific to the project domain.
- Learn to test and deploy the project.
- Understand the process of Documentation and deliver the presentations.

Course outcomes :

At the end of course, the Student will be able to:

CO1. Identify the Problem by applying the acquire Knowledge.
CO2. Analyze the principle and protocol of the proposed solutions
CO3. Design and Develop a proposed solution.
CO4. Test and Deploy the proposed modules
CO5. Implement, Compile the project report and deliver with presentations.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAP06 – Mini Project	CO1	3	3	3	3	-	-	3	2	3	2	3
	CO2	2	3	3	3	-	-	3	1	3	2	3
	CO3	3	3	3	3	2	3	3	3	3	2	3
	CO4	3	3	3	3	3	3	3	3	3	2	3
	CO5	3	3	3	3	3	3	3	3	3	3	3
Average		**2.80**	**3.00**	**3.00**	**3.00**	**2.67**	**3.00**	**3.00**	**2.40**	**3.00**	**2.20**	**3.00**

322CAE01 - DATA VISUALIZATION TECHNIQUES

BASIC PREREQUISITES:

- Knowledge in Data mining / Python

COURSE OBJECTIVES:

- To understand the categories of data quality principles.
- To describe data through visual representation.
- To provide basic knowledge about how large datasets are represented into visual graphics and easily understand the complex relationships within the data.
- To design effective visualization techniques for any different problems
- To learn about information dashboard design

UNIT - I INTRODUCTION 9

Visualization – visualization process – role of cognition – Pseudocode conventions – Scatter plot - Data foundation: Types of data - Structure within and between records - Data pre-processing – Human perceptions and information processing

UNIT - II VISUALIZATION FOUNDATIONS 9

Semiology of Graphical Symbols – Eight Visual Variables – Historical Perspective- Visualization Techniques for spatial data – One-dimensional data- two-dimensional data – Three-dimensional data- dynamic data – combining techniques- Visualization of Geospatial data – Visualization of Point, line, area data

UNIT - III DESIGNING EFFECTIVE VISUALIZATION 9

Steps in Designing Visualization – problems in Designing Effective Visualization – Comparing and evaluating visualization techniques – Visualization Systems

UNIT - IV INFORMATION DASHBOARD DESIGN 9

Characteristics of dashboards – Key goals in visual design process – Dashboard display media – Designing dashboards for usability – Meaningful organization – Maintaining consistency – Aesthetics of dashboards – Testing for usability – Case Studies: Sales dashboard, marketing analysis dashboard

UNIT - V VISUALIZATION SYSTEMS 9

Systems based on Data type-systems based on Analysis type – Text analysis and visualization – Modern integrated visualization systems – Toolkit-Research directions in visualization – issues of cognition, perception and reasoning –issues of evaluation - issues of Hardware

Total No. of Periods: 45

COURSE OUTCOMES:
At the end of course, the Student will be able to:
   CO1 : Examine the principles of visual perception
   CO2 : Analyze visualization techniques for various data analysis tasks – numerical data
   CO3 : Demonstrate the visualization techniques for various data analysis tasks – Non numerical data
   CO4 : Build Design information dashboard
   CO5 : Implement Visualization Systems.

REFERENCES:

1. Andy Kirk, "Data Visualization: A Handbook for Data Driven Design", 2nd Edition, Sage Publications, India, 2019.
2. Claus O.Wilke, "Fundamentals of Data Visualization", 1st Edition, O'Reilly Media, USA, 2019
3. Matthew O. Ward, Georges Grinstein, Daniel Keim "Interactive Data Visualization: Foundations, Techniques, and Applications", CRC Press; 2nd edition, 2015
4. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", 1 st Edition, O'Reilly, 2013.
5. Stephen Few, "Now you see it: Simple Visualization Techniques for Quantitative Analysis", 1 st Edition, Analytics Press, 2009.
6. Stephen Few, "Information Dashboard Design: The Effective Visual Communication of Data",1st Edition, O'Reilly,2006.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAE01 - DATA VISUALIZATION TECHNIQUES	CO1	3	3	3	3	1	-	1	2	3	2	-
	CO2	3	3	3	3	1	-	1	2	3	2	-
	CO3	3	3	3	3	2	-	2	3	3	2	1
	CO4	3	3	3	3	2	-	2	3	3	2	1
	CO5	3	3	3	3	2	-	2	3	3	2	1
Average		3.00	3.00	3.00	3.00	1.60	-	1.60	2.60	3.00	2.00	1.00

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322CAE02 - BIG DATA ANALYTICS

BASIC PREREQUISITES:

- Knowledge in Data structure / Data mining

COURSE OBJECTIVES:
- To learn the basic concept of data and analytics.
- To understand fundamental of Hadoop and HDFS
- To understand Hadoop Clustering
- To build MAPREDUCE Applications
- To compare the process of HIVE and HBASE

UNIT - I UNDERSTANDING BIG DATA   **9**

Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis –Nature of Data - Analytic Processes and Tools - Analysis Vs Reporting - Modern Data Analytic Tools- Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

UNIT - II BASICS OF HADOOP AND HDFS   **9**

History of Hadoop - Components of Hadoop -Application Development in Hadoop - Getting Data into Hadoop - Other Hadoop Components - Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop Distributed File System (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O.

UNIT - III HADOOP OPERATIONS WITH CLUSTERING   **9**

Hadoop Operations - Setting Up a Hadoop Cluster - Cluster Specification – Cluster Setup and Installation – Hadoop Configuration – Security – Benchmarking a Hadoop Cluster – Administrating Hadoop – Monitoring – Maintenance.

UNIT - IV MAP REDUCE APPLICATIONS   **9**

MapReduce workflows – Unit tests with MRUnit – Test data and local tests – Anatomy of a MapReduce job run – Classic MapReduce – YARN – Failures in Classic MapReduce and YARN – Job Scheduling – Shuffle and Sort – Task Execution – MapReduce Types – Input Formats – Output Formats.

Introduction of Hive - Installing Hive - An Example - Running Hive -Comparison with Traditional Databases – HiveQL – Tables - Querying Data – HBase – HBasics – Concepts – Installation – Clients - HBase versus RDBMS - Praxis.

Total No. of Periods: 45

COURSE OUTCOMES:
At the end of course, the Student will be able to:
- **CO1 :** Evaluate the Process of Big Data Analytics.
- **CO2 :** Ability to process the functionalities of Hadoop and HDFS.
- **CO3 :** Execute a simple application on Hadoop Clustering
- **CO4 :** Design and Develop a simple Map Reduce Applications
- **CO5 :** Implement an application based on HIVE and HBase

REFERENCES:

1. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 3rd edition 2020.
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytic for Enterprise Class Hadoop and Streaming Data", McGraw-Hill Publishing, 2012
3. Tom White, "Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale", Fourth Edition (Revised & Updated), Oreilly Media, 2015.
4. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John willey & sons 2012.
5. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
6. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
7. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAE02 - BIG DATA ANALYTICS	CO1	3	3	3	3	-	-	-	1	3	2	-
	CO2	3	3	3	3	-	3	3	2	3	2	-
	CO3	3	3	3	3	-	-	-	3	3	2	2
	CO4	3	3	3	3	3	-	1	3	3	2	3
	CO5	3	3	3	3	3	3	3	3	3	2	3
Average		3.00	3.00	3.00	3.00	3.00	3.00	2.33	2.40	3.00	2.00	2.67

322CAE03 - SOFTWARE DEVELOPMENT METHODOLOGY

COURSE OBJECTIVES:

- To understand Software Engineering Lifecycle Models
- To Know the basic Constructs of Agile Software Development
- To gain knowledge in the area of various Agile Methodologies.
- To understand software testing approaches
- To test the product finally to check the product Quality

UNIT - I INTRODUCTION   9

Importance of Software Engineering - Phases of software development lifecycle - SDLC - Software Process Model - Waterfall model - Prototyping model - Incremental model - RAD model - Spiral model - Version Control System.

UNIT - II FUNDAMENTALS OF AGILE   9

The Genesis of Agile - Introduction and background - Agile Manifesto and Principles - Overview of Scrum - Extreme Programming - Feature Driven Development - Adaptive Software Development - Lean Software Development - Agile project management - Design and development practices in Agile projects - Test Driven Development - Continuous Integration - Refactoring - Pair Programming - Simple Design - User Stories - Agile Testing - Agile Tools- The Payroll Case Study.

UNIT - III AGILE SCRUM FRAMEWORK   9

Introduction to Scrum - Project phases, Agile Estimation - Planning game - Product backlog - Sprint backlog - Iteration planning - User story definition - Characteristics and content of user stories - Acceptance tests and Verifying stories - Project velocity - Burn down chart - Sprint planning and retrospective - Daily scrum - Scrum roles - Product Owner - Scrum Master - Scrum Team - Scrum case study - Tools for Agile project management.

UNIT - IV TEST STRATEGIES   9

Testing Strategies – White Box and Black Box Approach – Integration Testing – System and Acceptance Testing – Performance Testing – Regression Testing - Internationalization Testing – Adhoc Testing – Website Testing – Usability Testing – Accessibility Testing.

Test plan - Management - Execution and Reporting - Software Test Automation - Automated Testing tools - Hierarchical Models of Software Quality - Configuration Management - Documentation Control.

                                               Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:
    CO1 : Examine the process of Software Development Lifecycle Models.
    CO2 : Analyze the functionalities of the Agile Scrum framework.
    CO3 : Apply the results for a specific need using agile techniques.
    CO4 : Articulate the various software testing methods.
    CO5 : Assess the various test cases for different types and level of testing.

REFERENCES:

1. Roger S. Pressman, "Software Engineering – A practitioner's Approach", 9th Edition, McGraw-Hill International Edition, 2019. ISBN 9781259872976
2. R. S. Pressman, "Software Engineering: A Practitioners Approach ", 7th Edition, McGraw Hill, 2019. ISBN 978-0073375977
3. Sommerville I, "Software Engineering", 10th Edition, Person Publications Publishing Company, 2016. ISBN 978-1-292-09613-1.
4. Craig Larman and Bas Vodde, "Large-Scale Scrum: More with LeSS", 1st Edition, Addison-Wesley Professional, 2016. ISBN 978-0321985712.
5. Pedro M. Santos, Marco Consolaro, and Alessandro Di Gioia, "Agile Technical Practices Distilled: A learning journey in technical practices and principles of software design", First edition, Packt Publisher 2019.
6. Rajib Mall, "Fundamentals of Software Engineering", 5th edition, PHI Learning Pvt. Ltd., 2018.
7. Ken Schawber, Mike Beedle, "Agile Software Development with Scrum", Pearson Publisher, 2014.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAE03 - SOFTWARE DEVELOPMENT METHODOLOGY	CO1	3	2	3	3	3	3	1	1	3	2	-
	CO2	2	2	2	2	3	3	1	1	3	2	-
	CO3	1	1	1	1	3	3	1	1	3	2	1
	CO4	1	-	1	-	3	3	2	1	3	2	2
	CO5	1	1	1	1	3	3	2	1	3	2	3
Average		1.60	1.20	1.60	1.40	3.00	3.00	1.40	1.00	3.00	2.00	2.00

322CAE04 - DEEP LEARNING TECHNIQUES

BASIC PREREQUISITES:

- Fundamentals of Artificial Intelligence and Machine Learning concept

COURSE OBJECTIVES:
- Develop and Train Deep Neural Networks.
- Develop a CNN, R-CNN, Fast R-CNN, Faster-R-CNN, Mask-RCNN for detection and recognition
- Build and train RNNs, work with NLP and Word Embedding
- The internal structure of LSTM and GRU and the differences between them
- The Auto Encoders for Image Processing

UNIT - I DEEP LEARNING CONCEPTS   **9**

Fundamentals about Deep Learning. Perception Learning Algorithms. Probabilistic modelling. Early Neural Networks. How Deep Learning different from Machine Learning. Scalars. Vectors. Matrixes, Higher Dimensional Tensors. Manipulating Tensors. Vector Data. Time Series Data. Image Data. Video Data.

UNIT - II NEURAL NETWORKS   **9**

About Neural Network. Building Blocks of Neural Network. Optimizers. Activation Functions. Loss Functions. Data Pre-processing for neural networks, Feature Engineering. Overfitting and under fitting. Hyper parameters.

UNIT - III CONVOLUTIONAL NEURAL NETWORK   **9**

Introduction to CNN - Linear Time Invariant - Image Processing Filtering - Building a convolutional neural network - Input Layers, Convolution Layers - Pooling Layers - Dense Layers - Backpropagation Through the Convolutional Layer - Filters and Feature Maps - Backpropagation Through the Pooling Layers - Dropout Layers and Regularization - Batch Normalization -Various Activation Functions.

UNIT - IV NATURAL LANGUAGE PROCESSING USING RNN   **9**

About NLP & its Toolkits - Language Modelling. Vector Space Model (VSM) - Continuous Bag of Words (CBOW) - Skip-Gram Model for Word Embedding - Part of Speech (PoS) Global Co-occurrence Statistics–based Word Vectors - Transfer Learning. Word2Vec - Global Vectors for Word Representation GloVe - Backpropagation Through Time - Bidirectional RNNs (BRNN) - Long Short Term Memory (LSTM) - Bi-directional LSTM - Sequence-to-Sequence Models (Seq2Seq) - Gated recurrent unit GRU.

About Deep Reinforcement Learning - Q-Learning. Deep Q-Network (DQN) - Policy Gradient Methods - Actor-Critic Algorithm - About Autoencoding. Convolutional Auto Encoding - Variational Auto Encoding - Generative Adversarial Networks - Autoencoders for Feature Extraction - Auto Encoders for Classification - Denoising Autoencoders - Sparse Autoencoders

Total No. of Periods: 45

COURSE OUTCOMES:
At the end of course, the Student will be able to:

    CO1 : Inspect the process Feature Extraction from Image and Video Data
    CO2 : Analyze Image Segmentation and Instance Segmentation in Images
    CO3 : Implement image recognition and image classification using a pre-trained network (Transfer Learning)
    CO4 : Predict Traffic Information analysis using Twitter Data
    CO5 : Monitor and implement Auto encoder for Classification & Feature Extraction

REFERENCES:

1. Deep Learning A Practitioner's Approach Josh Patterson and Adam Gibson O'Reilly Media, Inc.2017
2. Learn Keras for Deep Neural Networks, Jojo Moolayil, Apress,2018
3. Deep Learning Projects Using TensorFlow 2, Vinita Silaparasetty, Apress, 2020
4. Deep Learning with Python, françois chollet, manning shelter island,2017
5. Pro Deep Learning with TensorFlow, Santanu Pattanayak, Apress,2017

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAE04 - DEEP LEARNING TECHNIQUES	CO1	3	3	3	3	-	-	-	3	3	2	-
	CO2	3	3	3	3	-	-	-	3	3	2	-
	CO3	3	3	3	3	1	1	1	3	3	2	-
	CO4	3	3	3	3	2	1	1	3	3	3	1
	CO5	3	3	3	3	2	1	1	3	3	3	2
Average		3.00	3.00	3.00	3.00	1.60	1.00	1.00	3.00	3.00	2.40	1.50

322CAE05 - INFORMATION SECURITY

BASIC PREREQUISITES:

- Knowledge in Computer Networks / Operating Systems / Cyber Security

COURSE OBJECTIVES:

- To understand the basics of Information Security
- To know the legal- ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

UNIT I - INTRODUCTION   **9**

History – Information Security - Critical Characteristics of Information- NSTISSC Security Model- Components of an Information System-- Securing the Components- Balancing Security and Access- The SDLC- The Security SDLC.

UNIT II SECURITY INVESTIGATION   **9**

Need for Security- Business Needs- Threats- Attacks- Legal- Ethical and Professional Issues - An Overview of Computer Security - Access Control Matrix- Policy-Security policies- Confidentiality policies- Integrity policies- and Hybrid policies

UNIT III SECURITY ANALYSIS   **9**

Risk Management: Identifying and Assessing Risk- Assessing and Controlling Risk - Systems: Access Control Mechanisms- Information Flow and Confinement Problem

UNIT IV LOGICAL DESIGN   **9**

Blueprint for Security- Information Security Policy- Standards and Practices- ISO 17799/BS 7799- NIST Models- VISA International Security Model- Design of Security Architecture- Planning for Continuity

UNIT V PHYSICAL DESIGN   **9**

Security Technology- IDS- Scanning and Analysis Tools- Cryptography- Access Control Devices- Physical Security- Security and Personnel

Total No. of Periods: 45

COURSE OUTCOMES:
At the end of course, the Student will be able to:

CO1 : Discuss the basics of information security
CO2 : Illustrate the legal- ethical and professional issues in information security
CO3 : Demonstrate the aspects of risk management.
CO4 : Analyze various standards in the Information Security System
CO5 : Design and implementation of Security Techniques.

REFERENCES:

1. Mark Rhode-Ousley- "The Information Security – The complete reference"- Second Edition- Mc-Graw Hill Publications- 2020.
2. Michael E Whitman and Herbert J Mattord- ―Principles of Information Security‖- Vikas Publishing House- New Delhi- 2003
3. Micki Krause- Harold F. Tipton- ― Handbook of Information Security Management‖- Vol 1-3 CRCPress LLC- 2004.
4. Stuart McClure- Joel Scrambray- George Kurtz- ―Hacking Exposed‖- Tata McGraw-Hill- 2003
5. . Matt Bishop- ― Computer Security Art and Science‖- Pearson/PHI- 2002.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAE05 - INFORMATION SECURITY	CO1	-	-	2	3	2	3	3	2	2	1	-
	CO2	-	-	1	2	2	3	3	2	2	1	-
	CO3	-	2	2	1	2	3	3	2	2	1	1
	CO4	-	2	2	2	1	1	3	1	3	1	2
	CO5	-	2	1	1	1	1	3	1	3	1	2
Average		-	2.00	1.60	1.80	1.60	2.20	3.00	1.60	2.40	1.00	1.60

322CAE06 - FUNDAMENTALS OF ACCOUNTING

PREREQUISITES:

- The student they have the in-depth knowledge and the basic concept of according and working capital principle for better decision making.

COURSE OBJECTIVES:

- To understand the basic principles of Double entry system and preparation of balance sheet.
- To understand the process of estimating the cost of a particular product.
- To prepare the estimate for various business activities such as purchase, sale, production and cash budgets.
- To ensure decision making process of an organization
- To understand the elements of working capital.

UNIT - I INTRODUCTION TO ACCOUNTING   9

Meaning and Scope of Accounting – Principles – Concepts – Accounting Standards – Final Accounts –Trial Balance – Trading Account – Profit and Loss Account – Balance Sheet.

UNIT - II MARGINAL COSTING   9

Meaning – Objectives – Elements of Cost – Cost Sheet – Marginal Costing and Cost Volume Profit Analysis – Break Even Analysis – Applications – Limitations.

UNIT - III BUDGETS AND BUDGETARY CONTROL   9

Budgets and Budgetary Control – Meaning – Types – Sales Budget – Production Budget – Cost of Production Budget –Fixed& Flexible Budget – Cash Budget – Master Budget - Zero Base Budgeting.

UNIT – IV INVESTMENT DECISION AND COSTOF CAPITAL   9

Time Value of Money Concepts –Risk-Return Trade off- Capital Budgeting – Methods of Appraisal – Cost of Capital Factors Affecting Cost of Capital – Computation for Each Source of Finance and Weighted Average Cost of Capital.

UNIT - V WORKING CAPITAL MANAGEMENT   9

Concepts of Working Capital – Working Capital Policies – Factors Affecting Working Capital – Estimation of Working Capital Requirements.

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Evaluate balance sheet preparation and do analysis

CO2 : Examine the Cost Analysis and its elements

CO3 : Prepare the budget and control of a company**.**

CO4 : Ensures the factors to be considered in investment policies

CO5 : Assess the various policies and its requirements

REFERENCES:

1. Anutam Paul, "Financial Management", McGraw Hill Publication, 2020.
2. Steven J. Peterson ,Construction Accounting and Financial Management, Pearson Education, 2019.
3. Len Holm, "Cost Accounting and Financial Management for Construction Project Managers", CRC Press Publication, 2018.
4. Ravi M. Kishore, "Financial Management", Taxman Publishers, 2013.
5. S.N.Maheshwari, "Financial and Management Accounting", Sultan Chand & Sons, 2003.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAE06 - FUNDAMENTALS OF ACCOUNTING	CO1	-	-	-	-	1	3	3	2	-	1	3
	CO2	-	-	-	-	1	3	3	2	-	1	3
	CO3	-	-	-	-	2	3	3	3	-	1	3
	CO4	-	-	-	-	2	3	3	3	-	1	3
	CO5	-	-	-	-	2	3	3	3	-	1	3
Average		-	-	-	-	1.60	3.00	3.00	2.60	-	1.00	3.00

322CAE07 - BUSINESS PROCESSES

PREREQUISITES:

- The students maybe have the in depth knowledge on the basic concepts of business process is a set of related activities.

COURSE OBJECTIVES:

- An organization must carefully analyse and document their business processes
- Continuously assess the efficiency and effectiveness of these processes to minimize cost and maximize value creation.
- Cognize the interactions between human behaviour and process design.
- Managing Change in the Global Environment-BPR
- Organizational Frame Work and Implementation of business processes

UNIT - I ORGANIZATIONAL STRUCTURE   **9**

Types of Business Organizations-Organizational Structures-Definition-ComplexityFormulization-Size-Technology-Culture-Forms and Outcomes-Explanations of Structures-IT Industry and Organizational Structures

UNIT - II ORGANIZATIONAL OUTCOMES   **9**

Organizational Power and Power Outcomes-Leadership and Decision Making-Communication and Organizational Change-Organizational Environments and Effects-Inter and Intra organizational Relationships-Organizational Effectiveness

UNIT - III BUSINESS PROCESS RE-ENGINEERING   **9**

Introduction to Business Process Re-engineering (BPR)-Meaning-Types-Process-Impetrative for Survival-Strategic Approach-Implementing Business Process Re-Engineering-Methodology and Steps-Indian Scenario of Implementing BPR

UNIT - IV BPR AND IT INDUSTRY   **9**

BPR and Information Technology Process-People View and Perspectives-Empowering People through IT-Managing Change in the Global Environment-BPR Rediscovering Indian Paradigm Need of Reengineering

UNIT - V E-BUSINESS PROCESS   **9**

E-Business-Introduction-E-business vs. E-Commerce-Execution of E-business-Trends-Design for Execution-Construction-Types-Organizational Frame Work and Implementation-E-business Application Areas (CRM, ERP, SCM and Selling)-E Payment- E-Government-business and India

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1 : Develop new or improved innovative business processes from gap analysis.

CO2 : Analyze the key business processes that drive the value chain of an organization throughout the entire product life cycle.

CO3 : Evaluate current global business issues and their impact on various enterprises.

CO4 : Assess BPR and Information Technology Process-People View and Perspectives

CO5 : Implement E-business Application in the areas of CRM, ERP, SCM and Selling

REFERENCES:

1. Richard H.Hall, Organizations-Structures, Processes and Outcomes", Pearson Education, 2015
2. M.S.Jayaraman et. Al, "Business Process Reengineering", Tata Mc Graw Hill Publications, 2015
3. Ravi Kalakota and Marcia Robinson, "E-Business; Roadmap for Success; Pearson Education, 2016
4. Gareth Jones, "Organizational Theory, Design and Change", Pearson Education, 4th Edition, 2017
5. Dave Chaffey, "E-business and E-Commerce" Pearson Education, 2nd Edition,2016

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAE07 - BUSINESS PROCESSES	CO1	-	-	-	-	1	3	2	2	-	3	2
	CO2	-	-	-	-	1	3	2	2	-	3	2
	CO3	-	-	-	-	2	3	3	3	-	3	2
	CO4	-	-	-	-	2	3	3	3	-	3	3
	CO5	-	-	-	-	3	3	3	3	-	3	3
Average		-	-	-	-	1.80	3.00	2.60	2.60	-	3.00	2.40

322CAE08 - DIGITAL MARKETING

BASIC PREREQUISITES:

- Knowledge in Product and Services

COURSE OBJECTIVES:

- Know the important and growing role of digital marketing plays in both consumer and organizational target markets.
- Discussing current issues in digital marketing and customer service strategies,
- It focuses on effective CRM; key service delivery elements; and service recovery strategies that lead to the successful implementation of a customer focus.
- The Course aims at developing understating about the concepts, strategies, various functions, operations, activities and problems of Retail business decisions.
- To enhance student 's capability to identify and analyze business environment and its opportunities and limitations, Digital copy rights and Electronics commerce and Multimedia and digital video

UNIT – I INTRODUCTION 9

Going Digital – The changing face of advertising – The Technology behind digital marketing – Strategic thinking: Why you need a digital marketing strategy – Defining your digital marketing strategy – Understanding the digital marketing strategy – Understanding the digital consumer – Mind your Ps – Your window to the digital world – Mobile Marketing.

UNIT – II SEARCH ENGINE MARKETING 9

The search for success: Search: the online marketer`s holy grail – About the engines – Optimizing your site for the engines – Advertising on the search engines – Black Hat, the darker side of search – Bringing in the pros – Universal search –more opportunities to rank – Website intelligence and return on investment- display advertising Techniques

UNIT – III MARKETING TRENDS 9

E-mail marketing: The new direct mail – what exactly is e-mail marketing – Planning your campaign – Dos and Don`ts of an e-mail marketing campaign – Measuring your success – Still a vital component of digital marketing – Social media and online consumer engagement: join the conversation – What is social media – The different forms of social media – The rules of engagement – Social Media Analytics-Adding social media to your own site – Online PR and reputation management.

UNIT – IV AFFILIATE AND MARKETING ON INTERNET 9

Affiliate marketing and strategic partnerships: Recognizing opportunities for strategic partnership – What is affiliate marketing – The click that really counts – What advertisers should do – Digital media creative: Creative application of digital media – using an agency Digital creative: what works and what doesn`t – The age of new Information-Based marketing – Advertising on internet – Charting the on-line Marketing Process.

Search and resource discovery paradigms – Information search and retrieval – Information filtering – On-demand education and digital copy rights: Computer based education and training – Digital copy rights and Electronics commerce – Multimedia and digital video: Key multimedia concepts – Desk top video processing – Desk top video conferencing.

Total No. of Periods: 45

COURSE OUTCOMES:
At the end of course, the Student will be able to:
   CO1 : Evaluate digital business, opportunities and obstacles.
   CO2 : Acquire clarity in digital management practices and Advertising on the search engines.
   CO3 : Analyze the use of technology in retailing business.
   CO4 : Examine by adding social media and the practice of digital marketing.
   CO5 : Identify and analyses the different components of Computer based education and training in digital marketing.

REFERENCES:

1. Dawn McGruer, "Dynamic Digital Marketing", Wiley Publication, 2020.
2. Damian Ryan , Understanding Digital Marketing : Marketing Strategies for Engaging the Digital Generation, Kogan Page publisher, 3rd Edition, 2014.
3. Ravi Kalakota and Andrew B.Whinston, 'Frontiers of Electronic Commerce', Pearson Edu Inc., 9th Ed, 2009.
4. Deepak Bansal, A Complete Guide To Search Engine Optimization, B.R Publishing Corporation, Ist Edition, 2009.
5. Grienstein and Feinman- 'E-commerce –Security, Risk Management and Control', McGraw-Hill Inc.,US, Ed 2, 2009.
6. Jonah Berger, Contagious Why Things Catch On, Simon & Schuster, 2013.
7. E-Marketing: The essential guide to marketing in a digital world, Rob Stokes, Quirk eMarketing (Pty) Ltd. 5th Ed, 2013.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAE08 - DIGITAL MARKETING	CO1	-	3	2	2	-	-	-	3	-	3	3
	CO2	2	3	2	2	-	-	-	3	-	3	3
	CO3	-	-	-	3	1	3	3	3	-	3	3
	CO4	-	-	-	3	1	3	3	3	-	3	3
	CO5	-	-	-	-	-	-	-	3	-	3	3
Average		2.00	3.00	2.00	2.50	1.00	3.00	3.00	3.00	-	3.00	3.00

322CAE09 - HUMAN RESOURCE MANAGEMENT

PREREQUISITES:

- To provide knowledge about management issues related to staffing, training& compensation

COURSE OBJECTIVES:

- To provide a foundational understanding of human resource management practices and theories.
- To equip with a comprehensive understanding of human resource planning, recruitment, and selection processes
- Understand of compensation management, including wage and salary administration
- To provide in-depth understanding of training methods and strategies for employee development.
- To expose to the latest advancements and emerging trends in human resources management

UNIT - I INTRODUCTION TO HRM   9

Meaning, Scope, Definition and Objectives of HRM –Importance of human Factor-Challenges Inclusive growth and Affirmative action- Functions of HRM and Models of HRM - Activities and Challenges of HRM - Role of HR Manager - Human Resource Policy - HRM as Linked to Environmental changes.

UNIT - II HUMAN RESOURCE PLANNING &RECRUITMENT, SELECTION   9

HR Planning process - Job analysis, Job description & Job specification - Job Rotation, Job enlargement & Job enrichment - Job evaluation – RECRUITMENT: - Recruitment -Process & Methods of Recruitment. SELECTION: - Selection process - type of tests & types of interviews - Designing and conducting the effective interview - Induction and Placement.

**UNIT - III   WAGE AND SALARY ADMINISTRATION & APPRAISING AND
                       MANAGING PERFORMANCE   9**

Principles and techniques of wage fixation - Incentive schemes and plans. Appraisal process, methods, and potential problems in performance evaluations, Traditional Modern methods - Potential Appraisal - Methods to improve performance - Career Planning and Development.

UNIT – IV TRAINING AND EXECUTIVE DEVELOPMENT   9

Nature of Training - Methods of Training - Training Need Analysis- Training Design Training Evaluation-Management Development –Succession Planning-Coaching

UNIT – V RECENT TRENDS IN HR   9

HR outsourcing - Managing Attrition and Retention - Collective Bargaining - Grievance Management - Quality of work life – HR Accounting and Audit – Whistle Blowing – Employee poaching - HRIS- Diversity of Workforce Programs. –Emerging trends in HRM-HRM audit

Total No. of Periods: 45

COURSE OUTCOMES:

At the end of course, the Student will be able to:

  CO1 : Apply key concepts and best practices of human resource management.
  CO2 : Design a strategic human resource plans, recruit top talent effectively.
  CO3 : Design an equitable and strategic compensation plans.
  CO4 : Create comprehensive executive development plans.
  CO5 : Identify, analyze, and apply modern HR practices and trends in various organizational contexts.

REFERENCES

1. K.Aswathappa Human Resource Management TMH, 2017.
2. Dessler Human Resource Management, Pearson Education Limited, 2017
3. Luis R.Gomez-Mejia, David B.Balkin, Robert L Cardy. Managing Human Resource. PHI Learning. 2015 2. Bernadin, Human Resource Management, Tata Mcgraw Hill, 14th edition 2015
4. Scott Snell & George Bohlander Human Resource Management Thomson Learning 2009.
5. VSP Rao Human Resource Management -2016.
6. Raymond A. Noe John R. Hollenbeck Patrick M Wright Human Resource Management – Gaining a competitive advantage TMH 2007.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAE09 - HUMAN RESOURCE MANAGEMENT	CO1	-	-	-	-	3	3	3	3	-	2	3
	CO2	-	-	-	-	3	3	3	3	-	2	3
	CO3	-	-	-	-	3	3	3	3	-	2	3
	CO4	-	-	-	-	3	3	2	2	-	2	2
	CO5	-	-	-	-	3	3	3	3	-	2	3
Average		-	-	-	-	3.00	3.00	2.80	2.80	-	2.00	2.80

322CAE10 - WIRELESS SENSOR NETWORKS

PREREQUISITES:

- Knowledge in computer network

COURSE OBJECTIVES:

- Understand the fundamentals of Wireless Sensor Networks and Routing protocol
- Understand the different Sensor networks
- Illustrate depth knowledge on sensor network architecture and protocols
- Explain about Sensor network security and its challenges
- Utilize an exposure to mote programming platforms and tools

UNIT – I INTRODUCTION AND ROUTING PROTOCOLS   **9**

Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, WSN application examples Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Table Driven Routing Protocols – Destination Sequenced Distance Vector (DSDV), On–Demand Routing protocols –Ad hoc On–Demand Distance Vector Routing (AODV).

UNIT - II ARCHITECTURES   **9**

Single-Node Architecture – Hardware Components, Energy Consumption of Sensor Nodes, Network Architecture – Sensor Network Scenarios, Transceiver Design Considerations, Optimization Goals and Figures of Merit.

UNIT - III WSN NETWORKING CONCEPTS AND PROTOCOLS   **9**

MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols and Wakeup Concepts – S-MAC, The Mediation Device Protocol, Contention based protocols – PAMAS, Schedule based protocols – LEACH, IEEE 802.15.4 MAC protocol, Routing Protocols-Energy Efficient Routing, Challenges and Issues in Transport layer protocol.

UNIT – IV SENSOR NETWORK SECURITY   **9**

Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Layer wise attacks in wireless sensor networks, possible solutions for jamming, tampering, black hole attack, flooding attack. Key Distribution and Management, Secure Routing – SPINS, reliability requirements in sensor networks.

UNIT - V SENSOR NETWORK PLATFORMS AND TOOLS   **9**

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms – Tiny OS, nesC, CONTIKIOS, Node-level Simulators – NS2 and its extension to sensor networks, COOJA, TOSSIM, Programming beyond individual nodes – State centric programming.

Total No. of Periods: 45

COURSE OUTCOMES:
At the end of course, the Student will be able to:
    CO1 : Evaluate the basic process of Routing protocols.
    CO2 : Analyze the functionalities of Sensor network architectures
    CO3 : Summarize appropriate physical and MAC layer protocols
    CO4 : Identify the sensor network security and attacks
    CO5 : Examine with sensor network programming and tools

REFERENCES:

1. C. Siva Ram Murthy and B. S. Manoj, "Ad Hoc Wireless Networks Architectures and Protocols", Prentice Hall, PTR, 6th Printing February 2008.
2. Holger Karl , Andreas willig, "Protocol and Architecture for Wireless Sensor Networks", John wiley publication, Jan 2006
3. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks: an information processing approach", Elsevier publication, 2004.
4. I.F. Akyildiz, W. Su, Sankarasubramaniam, E. Cayirci, "Wireless sensor networks: a survey", computer networks, Elsevier, 2002, 394 - 422.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAE10 - WIRELESS SENSOR NETWORKS	CO1	3	2	2	2	1	2	1	2	1	2	-
	CO2	2	3	1	2	1	2	1	2	-	2	-
	CO3	3	2	1	2	2	2	1	1	3	2	-
	CO4	3	3	1	2	2	2	1	1	3	1	3
	CO5	3	3	3	3	2	2	1	1	3	1	3
Average		2.80	2.60	1.60	2.20	1.60	2.00	1.00	1.40	2.00	1.60	3.00

322CAL01- DATA VISUALIZATION TECHNIQUES LAB

BASIC PREREQUISITES:

- Knowledge in Python Programming

COURSE OBJECTIVES:

- To gain the knowledge in the categories of data quality principles.
- To describe data through visual representation.
- To design effective visualization techniques for any different problems.
- To develop a visualization technique.
- To Learn about cognition, perception and reasoning in visualizations.

LIST OF EXPERIMENTS

1. Implement Data Pre-processing with appropriate dataset

2. Apply Scatter Plot to visualize the data

3. Design Visualization Techniques using Spatial data

4. Develop Visualization of Geospatial Data

5. Designing Effective Visualization

6. Evaluating Visualization Techniques

7. Design simple dashboard

8. Develop Aesthetics of dashboard

9. Implement Text Analysis and Visualization

10. Cognition, Perception and Reasoning in visualization.

Total No. of Periods: 45

COURSE OUTCOMES:
   At the end of course, the Student will be able to:
   CO1 : Describe principles of Scatter plot to represent the data
   CO2 : Apply visualization techniques and Geospatial Data
   CO3 : Apply Effective Visualization techniques
   CO4 : Design Simple and Aesthetic dashboard
   CO5 : Design Analysis and Visualization of Data

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAL01- DATA VISUALIZATION TECHNIQUES LAB	CO1	3	3	3	3	1	-	-	-	3	2	-
	CO2	3	3	3	3	1	-	1	-	3	2	-
	CO3	3	3	3	3	1	1	1	3	3	2	1
	CO4	3	3	3	3	1	1	1	3	3	2	1
	CO5	3	3	3	3	1	1	1	3	3	2	2
Average		3.00	3.00	3.00	3.00	1.00	1.00	1.00	3.00	3.00	2.00	1.30

322CAL02 - MOBILE APPLICATION DEVELOPMENT LAB

BASIC PREREQUISITES:

- Knowledge in Java Programming and Database

COURSE OBJECTIVES:

- To know about various Controls, Views, and activities for developing mobile applications.
- To understand the functionalities of Intent, Images, and Video.
- To learn the process of Database for Mobile Applications
- To interactive Mobile Applications and MVC Framework
- To gain knowledge of Objective -C code for iOS applications

LIST OF EXPERIMENTS

1. Design a simple Mobile Application using Button Control

2. Design an application that uses Layout Manager and Event Listeners.

3. Built an application using intent

4. Display notification on the Status Bar

5. Design Image and video album

6. Develop an application using mobile database.

7. Design a Flutter application using Design and Animation

8. Develop a Flutter-based Android application using Forms and Gesture

9. Display text using iOS.

10. Create an interactive iOS application.

Total No. of Periods: 45

COURSE OUTCOMES:
At the end of course, the Student will be able to:
   CO1 : Apply an Android application using Controls, Views, and activities
   CO2 : Analyze the functionalities of Intent, Images, and Video.
   CO3 : Design a simple mobile application using Database connections.
   CO4 : Develop an interactive Mobile Application and MVC Framework
   CO5 : Implement an iOS application using Objective -C code

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAL02 - MOBILE APPLICATION DEVELOPMENT LAB	CO1	3	3	3	3	-	-	-	2	3	3	-
	CO2	3	3	3	3	-	-	-	2	3	3	-
	CO3	3	3	3	3	-	2	3	3	3	3	-
	CO4	3	3	3	3	3	2	3	3	3	3	3
	CO5	3	3	3	3	3	2	3	3	3	3	3
Average		3.00	3.00	3.00	3.00	3.00	2.00	3.00	2.60	3.00	3.00	3.00

322CAL03 - BIG DATA ANALYTICS LAB

BASIC PREREQUISITES:

- Knowledge in Java Programming / Python Programming
- Knowledge in Database

COURSE OBJECTIVES:

- Understand the basic concept of Hadoop
- To learn the fundamental concept of Hadoop and HDFS
- To gain the process of Hadoop Operation and Clustering
- To analyze the process of MapReduce applications
- Understand the basic concept of Hive and HBase.

LIST OF EXPERIMENTS

1. Implement a Sampling distribution for the given big data.

2. Write a script to predict the error from the dataset.

3. Write a script to analyze the data using Hadoop.

4. Design HDFS using Java Interface.

5. Write a program to perform any two Hadoop Operation.

6. Implement a simple Hadoop Cluster.

7. Write a program to perform matrix multiplication using Map Reduce

8. Write a program to count the words using Map Reduce.

9. Implement the basics of HiveQL.

10. Practice HBase in any two process

COURSE OUTCOMES:

At the end of course, the Student will be able to:

CO1: Evaluate a script using distribution and prediction of error.
CO2: Analyze and Design Program using Hadoop and HDFS
CO3: Develop Hadoop Operations and Cluster.
CO4: Design and Develop a program using Map Reduce Applications
CO5: Implement a simple application using Hive and HBase.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAL03 - BIG DATA ANALYTICS LAB	CO1	3	3	3	3	-	-	-	1	3	3	-
	CO2	3	3	3	3	-	-	-	1	3	3	-
	CO3	3	3	3	3	-	3	3	3	3	3	2
	CO4	3	3	3	3	3	3	3	3	3	3	2
	CO5	3	3	3	3	3	-	3	3	3	3	2
Average		3.00	3.00	3.00	3.00	3.00	3.00	3.00	2.20	3.00	3.00	2.00

322CAL04 - SECURITY LAB

BASIC PREREQUISITES:

- Knowledge in Scripting

COURSE OBJECTIVES:

- To understand the basic concept of security
- To Analysis the level of security.
- To learn different cipher techniques
- To implement the algorithms DES- RSA-MD5- SHA-1
- To use network security tools and vulnerability assessment tools

LIST OF EXPERIMENTS

1. Perform encryption- decryption using the following substitution techniques

   (i) Ceaser cipher
   (ii) playfair cipher
   iii) Hill Cipher
   iv) Vigenere cipher

2. Perform encryption and decryption using following transposition techniques

   i) Rail fence
   ii) Row & Column Transformation

3. Apply DES algorithm for practical applications.

4. Apply AES algorithm for practical applications.

5. Implement RSA Algorithm.

6. Implement the Diffie-Hellman Key Exchange algorithm for a given problem.

7. Calculate the message digest of a text using the SHA-1 algorithm.

8. Implement the SIGNATURE SCHEME – Digital Signature Standard.

COURSE OUTCOMES:

At the end of course, the Student will be able to:

   CO1 : Develop code for classical Encryption Techniques to solve the problems.
   CO2 : Build cryptosystems by applying symmetric and public key encryption algorithms.
   CO3 : Construct code for authentication algorithms.
   CO4 : Develop a signature scheme using Digital signature standard.
   CO5 : Demonstrate the network security system using open source tools

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAL04 - SECURITY LAB	CO1	3	3	3	3	-	1	3	1	3	2	
	CO2	3	3	3	3	-	2	3	2	3	2	
	CO3	3	3	3	3	1	1	3	-	3	2	
	CO4	3	3	3	3	1	1	3	1	3	2	1
	CO5	3	3	3	3	-	1	3	1	3	2	2
Average		3.00	3.00	3.00	3.00	1.00	1.20	3	1.25	3.00	2.00	1.50

322CAL05 - SOFTWARE TESTING LAB

BASIC PREREQUISITES:
- Knowledge in Scripting and database

COURSE OBJECTIVES:
- To discuss the distinctions between validation testing and defect testing.
- To describe the principles of system and component testing.
- To describe strategies for generating system test cases.
- To understand the essential characteristics of tool used for test automation.

LIST OF EXPERIMENTS

1. Write a simple script using Java / PHP.
2. Understanding Test Automation. Using Selenium write a simple test script to validate each field of the registration page.
3. Using Selenium IDE, write a test suite containing minimum 4 test cases
4. Write and test a program to login a specific web page.
5. Write test cases to validate a mobile number using one time pin identification(OTP)
6. Write and test any program using Unit Testing.
7. Write and test a program to provide total number of objects present / available on the page
8. Write and test a program to get the number of list items in a list / combo box.
9. Write and test a program to count number of check boxes on the page checked and unchecked count.
10. Demonstrate mobile app testing using APPIUM

COURSE OUTCOMES:
At the end of course, the Student will be able to:
CO1 : Test the software by applying various testing techniques.
CO2 : Debug the project and to test the entire computer based systems at all levels.
CO3 : Analyze the applications in the specialized environment using various automation tools.
CO4 : Evaluate the web applications using bug tracking tools.
CO5 : Apply quality and reliability metrics to ensure the performance of the software.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
322CAL05 - SOFTWARE TESTING LAB	CO1	3	3	3	3	1	-	-	1	3	3	-
	CO2	3	3	3	3	1	-	1	1	3	3	-
	CO3	3	3	3	3	1	-	1	3	3	3	-
	CO4	3	3	3	3	1	-	1	3	3	3	1
	CO5	3	3	3	3	1	-	2	3	3	3	1
Average		3.00	3.00	3.00	3.00	1.00	-	1.25	2.20	3.00	3.00	1.00

422CAP01 – PROJECT WORK

L T P C
0 0 35 15

Course Objectives

- Learn theoretical knowledge and practical skills acquired during their academic studies to a real-world project.
- Understand the required data to make effective applications.
- Gain the technical skills specific to the project domain.
- Learn to test and deploy the project.
- Understand the process of Documentation and deliver the presentations.

Course outcomes :

At the end of course, the Student will be able to:

CO1. Identify the Problem by applying the acquire Knowledge.
CO2. Analyze the principle and protocol of the proposed solutions
CO3. Design and Develop a proposed solution.
CO4. Test and Deploy the proposed modules
CO5. Implement, Compile the project report and deliver with presentations.

Course Name	COs	Program outcomes (Washington Accord Attributes)								PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
422CAP06 – Project Work	CO1	3	3	3	3	2	2	1	2	3	2	-
	CO2	2	3	3	3	2	1	1	1	3	2	-
	CO3	3	3	3	3	2	1	3	3	3	2	2
	CO4	3	3	3	3	3	2	3	3	3	2	2
	CO5	3	3	3	3	3	1	3	3	3	3	2
Average		2.80	3.00	3.00	3.00	2.40	1.40	2.20	2.40	3.00	2.20	2.00