HINDUSTHAN EDUCATIONAL AND CHARITABLE TRUST

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HINDUSTHAN

COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution)

Coimbatore – 641032

DEPARTMENT OF COMPUTER APPLICATIONS

Curriculum and ODD Semesters Syllabus for the Batch

2024 – 2026 (R2024)

2023 – 2025 (R2020)

(Board of Studies held on 18.05.2024)

(Academic Council Meeting held on 21.06.2024)

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DETAILS OF REVISED CURRICULUM & SYLLABUS

CBCS PATTERN

POSTGRADUATE PROGRAMMES

MCA. COMPUTER APPLICATIONS (PG)

REGULATION-2024

(For the students admitted during the academic year 2024-2054 and onwards)

SEMESTER I – BRIDGE COURSE

S.No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	24CA1291	PoP& OOPS	BRIDGE	3	0	0	-	100	0	100
2.	24CA1292	Fundamentals Of Web Designing	BRIDGE	3	0	0	-	100	0	100
PRACTICAL										
3.	24CA1091	PoP& OOPS LAB	BRIDGE	0	0	3	-	100	0	100
			Total	**6**	**0**	**3**	**0**	**300**	**0**	**300**

SEMESTER I – REGULAR COURSE

S.No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	24CA1201	Data Communication and Networking	PCC	3	0	0	3	40	60	100
2.	24CA1202	Database Management Systems	PCC	3	0	0	3	40	60	100
3.	24CA1203	Java Programming	PCC	3	1	0	4	40	60	100
4.	24CA1204	Research Methodology	RMC	3	0	0	3	40	60	100
5.	24CA1251	Web Technology(T+L)	PCC	3	0	2	4	50	50	100
6.	24MA1105	Probability and Statistics for Data Analytics (T+L)	FC	3	0	2	4	50	50	100
PRACTICAL										
7.	24CA1001	Database Management System Lab	EEC	0	0	3	1.5	60	40	100
8.	24CA1002	Java Programming Lab	EEC	0	0	3	1.5	60	40	100
			Total	**18**	**1**	**10**	**24**	**380**	**420**	**800**

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SEMESTER II – BRIDGE COURSE

S.No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	24CA2291	Software Engineering	BRIDGE	3	0	0	-	100	0	100
2.	24CA2292	Operating System	BRIDGE	3	0	0	-	100	0	100
PRACTICAL										
3.	24CA2091	Software Engineering Tools Lab	BRIDGE	0	0	3	-	100	0	100
			Total	**8**	**0**	**2**	**0**	**300**	**0**	**300**

SEMESTER II

S.No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	24CA2201	Data Structures and Algorithms	PCC	3	1	0	4	40	60	100
2.	24CA2202	Data Intensive Computing using Python	PCC	3	1	0	4	40	60	100
3.	24CA2251	Full Stack Web Development(T+L)	PCC	3	0	2	4	50	50	100
4.	24CA2252	Cryptography and Network Security(T+L)	PCC	3	0	2	4	50	50	100
5.	24EC2251	Embedded System and Sensors (T + L)	PCC	2	0	2	3	50	50	100
6.	24CA23XX	Professional Elective I	PEC	3	0	0	3	40	60	100
PRACTICAL										
7.	24CA2001	Data Structures and Algorithms Lab	EEC	0	0	3	1.5	60	40	100
8.	24CA2002	Data Incentive Computing Lab	EEC	0	0	3	1.5	60	40	100
			Total	**17**	**2**	**12**	**25**	**390**	**410**	**800**

SEMESTER III

S.No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	24CA3201	Deep Learning and Data Visualization	PCC	3	1	0	4	40	60	100
2.	24CA3251	Artificial Intelligence (T + L)	PCC	3	0	2	4	50	50	100
3.	24EC3251	Internet of Things (T+L)	PCC	3	0	2	4	50	50	100
4.	24CA33XX	Professional Elective II	PEC	3	0	0	3	40	60	100
5.	24CA33XX	Professional Elective -III	PEC	3	0	0	3	40	60	100
6.	24CA33XX	Professional Elective IV	PEC	3	0	0	3	40	60	100
PRACTICAL										
7.	24CA3801	Mini Project Lab	EEC	0	0	3	1.5	60	40	100
8.	24CA3002	Deep Learning Lab	EEC	0	0	3	1.5	60	40	100
			Total	**18**	**1**	**10**	**24**	**370**	**430**	**800**

SEMESTER IV

S.No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	24CA4901	Project Work	EEC	0	0	24	12	60	40	100
			Total	**0**	**0**	**24**	**12**	**60**	**40**	**100**

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LIST OF PROFESSIONAL ELECTIVES

S.No.	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
PROFESSIONAL ELECTIVE I										
1	24CA2301	Accounting and Financial Management	PE	3	0	0	3	40	60	100
2	24CA2302	Block Chain Technologies	PE	3	0	0	3	40	60	100
3	24CA2303	Cyber Security	PE	3	0	0	3	40	60	100
4	24CA2304	Digital Logic and Computer Organization	PE	3	0	0	3	40	60	100
5	24CA2305	E-Learning Techniques	PE	3	0	0	3	40	60	100
6	24CA2306	Green Computing	PE	3	0	0	3	40	60	100
7	24CA2307	Human Computer Interaction	PE	3	0	0	3	40	60	100
8	24CA2308	Professional Ethics	PE	3	0	0	3	40	60	100
PROFESSIONAL ELECTIVE II, III, IV										
1	24CA3301	Cloud Computing	PE	3	0	0	3	40	60	100
2	24CA3302	E- Commerce	PE	3	0	0	3	40	60	100
3	24CA3303	Ethical Hacking	PE	3	0	0	3	40	60	100
4	24CA3304	Mixed Reality	PE	3	0	0	3	40	60	100
5	24CA3305	Organizational Behavior	PE	3	0	0	3	40	60	100
6	24CA3306	Semantic Web Services	PE	3	0	0	3	40	60	100
7	24CA3307	Service Oriented Architectures and Microservices	PE	3	0	0	3	40	60	100
8	24CA3308	Social Network Analysis	PE	3	0	0	3	40	60	100
9	24CA3309	Soft Computing Techniques	PE	3	0	0	3	40	60	100
10	24CA3310	Software Testing and Automation	PE	3	0	0	3	40	60	100

CREDIT DISTRIBUTION

	PCC	PEC	FC	RMC	EEC	Total
Credits	45	12	4	3	21	**85**
Credits %	52.9	14.1	4.7	3.5	24.7	**100**

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SYLLABUS REVISION DETAILS FOR THE REGULATION 2024 – ACADEMIC YEAR 2024-25 ODD SEMESTER

S.NO	COURSE CODE/COURSE NAME	SUGGESTION BY EXPERTS	EXISTING CONTENT (IN THE AY2022-23 ODD)	REVISED CONTENT (FOR AY 2024-25 ODD)	TYPE OF REVISION DELETION/INSERTION/ MODIFICATION	PERCENTAGE OF REVISION
1	24CA1202 – Database Management Systems	Suggestions to revise the syllabus.	**INTRODUCTION** Introduction-Database System Applications, Purpose of Database Systems, View of Data – Database Languages, Database and Application Architecture, Database Users and Administrators – Database Schema – Keys – Schema Diagrams - ER diagrams – Mapping Cardinalities – Data Flow Diagram	**UNIT I INTRODUCTION** Database & Database Users. Characteristics of the Database Approach advantages of using DBMS. Data Models, Schemas & Instances. DBMS Architecture & Data Independence. System Architecture for DBMS and Data Dictionary, Database Users Data Base languages & Interfaces. Data Modeling using the Entity-Relationship Model -Entity types, Entity Sets, Attributes and Keys, Relationship, Relationship Types, Week Entity Types, Structural Constraints, Enhanced ER Model- Specialization Generalization, Constraints on Specialization Generalization - Data flow diagram.	Content Revised	45%
			SQL AND PL / SQL Introduction to SQL – DDL – DML Commands – Basic Structure of SQL Queries – Set Operations – Null Values – Aggregate Functions – **Nested Sub Queries** –	**UNIT-II RELATIONAL MODEL, LANGUAGES & SYSTEMS** Relational Data Model Concepts and Constraints. Relational Algebra - select, project, set theoretic, join operations.		

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			Intermediate SQL – Joins, Views and Transactions.	Overview of Relational Calculus. SQL - A Relational Database Language. Data Definition commands, View and Queries, transaction commands, Specifying Constraints & Indexes in SQL		
			DATABASE DESIGN Advanced SQL – Exceptional Handling using PL/SQL – Triggers & Cursors – Functions and Procedures – Subquery – Independent sub query - Correlated Sub Query- Functional Dependency - Reasoning about FDS-Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).	**UNIT III DATABASE DESIGN** Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form		
			TRANSACTION PROCESSING Introduction- Transaction Concepts-Concurrency Control- Locking Methods for Concurrency Control- Timestamp Methods for concurrency control- Optimistic Methods for concurrency control.	**UNIT IV TRANSACTIONS, CONCURRENCY CONTROL, RECOVERY TECHNIQUEs** Basic concept; ACID properties; transaction state; implementation of atomicity and durability-- concurrent executions; basic idea of serializability - view and conflict serializability Recovery Techniques Failure Classification - Storage Structure - Recovery and Atomicity Log Based Recovery - Shadow Paging - stable storage implementation - data access; recovery and atomicity - log based recovery, deferred database		

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SYLLABUS REVISION DETAILS FOR THE REGULATION 2024 – ACADEMIC YEAR 2024-25 ODD SEMESTER

				modification- immediate database modification-checkpoints.		
			OODBMS AND ORDBMS Overview, Complex Data Types, ODBMS & ORDBMS, Structured Types and Inheritance in SQL, Table Inheritance, Object-Identity and Reference Types in SQL. Unstructured database – NOSQL an Overview	**UNIT V EMERGING FIELDS IN DBMS** Distributed databases; Basic idea-distributed data storage- data replication-data fragmentation horizontal, vertical and mixed fragmentation. Concepts of Multimedia databases - Object oriented data base management systems - Data Warehousing & mining.		
2	24CA1001 – Database Management Systems Lab	Suggestions to revise the syllabus	1. Implement the Installation process of Oracle databasefrom scratch. 2. XYZ hospital is a multi-specialty hospital that includes a number of departments, rooms, doctors, nurses, compounders, and other staff working in the hospital. Patients having different kinds of ailments come to the hospital and get checkup done from the concerned doctors. If required they are admitted in the hospital and discharged after treatment. Draw ER Diagram for the above scenario. 3. Construct DFD for restaurant management system with details of sales, order, events, bills and employees 4. Design a user management system that allows administrators to perform CRUD (Create, Read, Update, Delete) operations on user accounts and manage user permissions	1. Draw ER Diagram for an Application. 2. Construct DFD for an Application. 3. Execute a DDL, DML, DCL and TCL commands for a Table 4. Execute SQL Functions 5. Execute various Joins and Sub Queries 6. Given an Scenario, Apply Normalization at all levels. 7. Write PL/SQL Procedure for an application using Exception Handling 8. Write PL/SQL Procedure for an application using Cursors. 9. Write a PL/SQL program for an application using Functions. 10. Write a PL/SQL block for transaction operations of a typical application using Triggers 11. Case Study using any of the real life database applications from the following list		

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			using DDL, DML, DCL, and TCL statements. 5. SQL Functions - Create a database schema that includes tables such as sales, products, customers, and orders to store relevant information. i.Combine data from multiple tables and retrieve relevant information for analysis. ii.Filter data based on specific conditions and perform aggregations on subsets of data. 6.Consider a data base table consists of student details. Management also wants to add marks scored by student for all the subjects. 101001 Ravi CSE 5 CS2304 System Software 78 C 101001 Ravi CSE 5 CS2301 Software Engineering 99 A 101001 Ravi CSE 5 CS2302 Computer Networks 88 B 101001 Arul CSE 5 CS2304 System Software 98 A 101001 Arul CSE 5 CS2301 Software Engineering 96 A 101001 Arul CSE 5 CS2302 Computer Networks 87 B Questions:	• Inventory Management for a E Mart Grocery Shop • Society Financial Management Build Entity Model diagram. The diagram should align with the business and functional goals stated in the application. Apply Normalization rules in designing the tables in scope. Prepared applicable views, triggers (for auditing purposes), functions for enabling enterprise grade features. Build PL SQL / Stored Procedures for Complex Functionalities, ex EOD Batch Processing for calculating the EMI for Gold Loan for each eligible Customer.		

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SYLLABUS REVISION DETAILS FOR THE REGULATION 2024 – ACADEMIC YEAR 2024-25 ODD SEMESTER

			i.Eliminate the redundancy from the above table. ii.Eliminate Data manipulation anomalies and Data inconsistency from the above table. 7.Develope an inventory management system for a retail company. The system tracks inventory levels, handles stock updates, and generates reports. Design and implement functions and triggers in PL/SQL to enhance the functionality of the system. i.utilize functions and triggers in PL/SQL to automate stock updates and generate inventory reports in an inventory management system. 8.Exercise using NoSQL Database			

I SEMESTER – NEW COURSES

R2024	
24CA1201	Data Communication and Networking
24CA1204	Research Methodology
24CA1251	Web Technology(T+L)
24MA1105	Probability and Statistics for Data Analytics (T+L)

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SEMESTER I – BRIDGE COURSE

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24CA1291	PoP AND OOPS	L	T	P	C
		3	0	0	-

COURSE OBJECTIVE

1. To Understand the basics concepts in C programming
2. To learn and apply arrays and pointers in C.
3. To gain knowledge in fundamentals of Object-Oriented Programming.
4. To gain proficiency in usage of classes and objects.
5. To explore advanced features of object-oriented programming

Pre Requisite Nil

UNIT I INTRODUCTION 9

Process of programming – Variables- Operators – Loops- Break statement – Continue Statement- Data Types in C – ASCII Code - Operators Expressions Associatively - Precedence of operators - Expression evaluation – Functions

UNIT II ARRAYS AND POINTERS 9

Arrays in C -Pointers in C -Programming using arrays and pointers -Sizeof operator -Returning pointers from functions – Recursion -Multidimensional Arrays and Pointers- Structures in C -Singly Linked Lists - Doubly Linked Lists- File Handling

UNIT III EVOLUTION OF OOP LANGUAGES 9

Why OOPS –Characteristics of OOPS - Introduction to C++ - Programs with IO and Loop - Arrays and Strings- Function Overloading -Operator Overloading - Dynamic Memory Management

UNIT IV CLASSES AND OBJECTS 9

Access Specifiers - Constructors, Destructors and Object Lifetime - Copy Constructor and Copy Assignment Operator- Constants - Static Members - friend Function and friend Class

UNIT V ADVANCED FEATURES 9

Overloading Operator for User Defined Types-Namespace -Inheritance -Virtual Function Table - Type casting and cast operators -Multiple Inheritance – Exceptions –Template -Closing Comments

Theory Hours : 3 **Tutorial Hours : 0** **Practical Hours : 0** **Total Hours: 45 Hrs**

COURSE OUTCOME

CO1: Illustrate and explain the basic computer concepts and programming principles of C language.
CO2: Demonstrate the applications of derived data types such as arrays, pointers, strings and functions.
CO3: Build programs in C++ using Overloading,
CO4: Develop skills in handling exceptions, working with classes and objects,
CO5: Construct C++ programs using advanced features of Oops

REFERENCES

R1. C++ Programming for Beginners An Object Oriented Language, Hong Lei, 2021

R2. Effective C: An Introduction to Professional C Programming, Robert C. Seacord, 2020.

PROGRMME OUTCOMES (PO's)
3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak

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CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	1	3	1	-	-	1
CO2	3	2	2	3	2	-	-	1
CO3	3	2	3	3	2	-	-	2
CO4	3	2	3	3	2	-	-	2
CO5	3	2	3	3	2	1	1	2

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. Demonstration 4. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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24CA1292	FUNDAMENTALS OF WEB DESIGNING	L	T	P	C
		3	0	0	-

COURSE OBJECTIVE

1. To introduce the fundamentals of Internet, and the principles of web design.
2. To construct basic websites using HTML.
3. To Design basic websites using and Cascading Style Sheets.
4. Knowledge in advanced features of Cascading Style Sheets.
5. To build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.

Pre Requisite **Nil**

UNIT I - INTRODUCTION TO WWW 9

Internet Standards – Introduction to WWW – WWW Architecture – SMTP – POP3 – File Transfer Protocol - Overview of HTTP, HTTP request – response — Generation of dynamic web pages

UNIT II - UI DESIGN 9

Markup Language (HTML): Introduction to HTML and HTML5 - Formatting and Fonts -Commenting Code – Anchors – Backgrounds – Images – Hyperlinks – Lists

UNIT III - CASCADING STYLE SHEET (CSS) 9

The need for CSS, Introduction to CSS – Basic syntax and structure - Inline Styles – Embedding Style Sheets - Linking External Style Sheets

UNIT IV - CASCADING STYLE SHEET (CSS) 9

Backgrounds - Manipulating text - Margins and Padding - Positioning using CSS.

UNIT V - SCRIPTING LANGUAGES 9

HTML – forms – frames – tables – web page design - JavaScript introduction – control structures – functions – arrays – objects – simple web applications.

Theory Hours : 3 **Tutorial Hours : 0** **Practical Hours : 0** **Total Hours: 45 Hrs**

COURSE OUTCOME

CO1: Gain Profiency in concepts of World Wide Web, and the requirements of effective web design
CO2: Develop web pages using the HTML
CO3: Construct web page using CSS features with different layouts as per need of applications.
CO4: Develop web pages using advanced features of CSS.
CO5: Use the JavaScript to develop the dynamic web pages.

REFERENCES

R1. Harvey & Paul Deitel& Associates, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web - How To Program", Fifth Edition, Pearson Education, 2011.
R2. Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition Tata McGraw-Hill 2010.
R3. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013.
R4. Margaret Levine Young, "Internet and WWW", 2nd Edition, Tata McGraw Hill, 2002.

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R5. Jeff Rule, Dynamic HTML: The HTML Developer's Guide, Addison-Wesley, 1999.R4. William Stallings, "Computer Organization and Architecture – Designing for Performance", Tenth Edition, Pearson Education, 2016.

PROGRMME OUTCOMES (PO's) 3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak								
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	1	2	-	-	-	1
CO2	3	2	2	3	-	-	-	1
CO3	3	2	3	3	1	-	-	1
CO4	3	3	3	3	2	-	-	2
CO5	3	3	3	3	2	1	2	2

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. Demonstration 4. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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24CA1091	PoP AND OOPS LAB	L	T	P	C
		2	0	2	-

COURSE OBJECTIVE

1. Able to understand the fundamental properties of C Language.
2. Knowledge of implementing data structures in C programming. Understanding sorting and searching algorithms.
3. Understand the syntax of C++ and writing simple to advanced programs.
4. To understand the need and role of object-oriented programming for real-world applications.
5. Understand the concept of virtual functions.

Pre Requisite **Nil**

1. Write a C program to check whether a number is even or odd	6
2. Write a C Program to Check Leap Year	6
3. Write a C Program to Find Factorial of a Number	3
4. Write a program to search a given element in array using linear search.	6
5. To find the smallest and largest element from a given array.	3
To Sort n numbers using bubble sort using function sub program.	3
Write a C++ program to perform String Concatenation • using Arrays • Using Functions • Using Arrays & functions Using Pointers & Functions	3
Write a C++ Program to illustrate the use of Constructors and Destructors and Constructor Overloading.	6
Write a program to Illustrate Friend Function and Friend Class.	3
Write C++ Programs and incorporating various forms of Inheritance.	3
Write a C++ Program to illustrate Virtual functions	3

Theory Hours :0 **Tutorial Hours : 0** **Practical Hours :3** **Total Hours: 45**

COURSE OUTCOME

CO1: Develop a strong foundation in C programming by practicing basic algorithmic problem-solving.
CO2: Able to identify the appropriate data structures and algorithms for solving real world problems and implement various kinds of searching and sorting techniques.
CO3: Demonstrate the ability to manipulate strings using arrays in C++.
CO4: Develop programs in C++ using advanced concepts in OOPS.
CO5: Design and implement C++ programs that utilize inheritance and virtual functions.

REFERENCES

1. The C++ Programming Language (4th Edition) By Bjarne Stroustrup,2013
2. C Programming Language (2nd Edition) By Brian W. Kernighan & Dennis M. Ritchie, 2015
3. Stanley B. Lippman, Josée Lajoie, Barbara E, C++ Primer. Moo, Addison-Wesley Professional: 2020

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4. Object-Oriented Programming in C++ (4th Edition) , Robert Lafore, Sams Publishing, 2021
5. E.Balagurusamy , Object Oriented Programming with C++, 8th Edition, Paperback September 2020.

PROGRMME OUTCOMES (PO's) 3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak								
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	2	3	1	-	-	1
CO2	3	3	2	3	2	-	-	1
CO3	3	2	2	3	1	-	-	1
CO4	3	3	3	3	1	-	-	1
CO5	3	3	3	3	2	1	1	2

COURSE ASSESSMENT METHODS			
DIRECT	1. Unit wise test for all Units 2. Blended Learning 3. Demonstration	**INDIRECT**	4. Course Exit Survey

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SEMESTER I - REGULAR COURSE

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24CA1201	DATA COMMUNICATION AND NETWORKING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

1. To explore the different types of networking concept and their applications.
2. To analyze the operation and protocols of wired and wireless LANs, including their architectures and technologies.
3. To analyze the networking protocols and standards to facilitate interoperability and efficient data exchange.
4. To explore the mechanisms for connection establishment and release in transport layer protocols.
5. To compare the architecture and operation of popular internet applications such as email clients, web browsers, and FTP clients.

Pre Requisite **Good understanding of how to use computers, including knowledge of operating systems**

UNIT I INTRODUCTION OF NETWORKS — 6

Uses of computer networks - Network hardware - Network software - Reference models - Physical Layer: Theoretical basis for data communication - Guided transmission media: Twisted pairs - Coaxial cable - Fiber Optics - Unguided transmission: The Electromagnetic spectrum - Radio wave transmission- Micro wave transmission -Infrared transmission.

UNIT II DATA LINK LAYER — 9

Data Link Layer - Framing - Flow Control - Error Control - Error detection and correction: Types of Errors, Block Coding – Cyclic Codes – Checksum- Forward Error Correction: Hamming Distance – Data Link Control: DLC Services – Data-Link Layer Protocols - HDLC. Wired LANs & Wireless LANs.

UNIT III NETWORK LAYER — 12

Switching – Circuit Switched Networks - Packet Switching – Structure of a Switch - Routing algorithms: Shortest Path events - Distance Vector Routing - Link State Routing - Congestion control algorithms: Traffic aware routing - Admission Control - Internetworking: Tunneling - Internetwork Routing - Packet Fragmentation.

UNIT IV TRANSPORT LAYER — 9

Transport Service primitives - Connection Establishment and Release- Elements of transport protocols: Addressing - Connection Establishment and Release – The internet transport protocols: UDP – RPC - TCP: Service Model.

UNIT V APPLICATION LAYER — 9

Domain Name System: The DNS Name Space - Resource Records - Name Servers - Electronic mail: Architecture and Services - The User Agents - Message Formats - Message Transfer and Delivery - World Wide Web: Architectural overview - Static and Dynamic Web Pages - HTTP - Mobile Web - Web Search.

Theory Hours : 3 **Tutorial Hours : 0** **Practical Hours : 0** **Total Hours: 45 Hours**

COURSE OUTCOME

CO1. Identify the theoretical concepts underlying data communication at the Physical Layer.
CO2. Evaluate the suitability of different Data Link Layer protocols for particular network environments.
CO3. Apply various routing protocols, demonstrate the best routing between nodes and describe the network functionalities for a given application.
CO4. Demonstrate understanding of transport layer services and protocols.
CO5. Develop innovative solutions for addressing specific application layer communication requirements and challenges.

REFERENCES

1. Andrew S. Tanenbaum, David J Wetherall, Nick Feamster, "Computer Networks", 6th Edition, Pearson Education., New Delhi, 2022.

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2. Forouzan Behrouz A., "Data Communication and Networking", 5th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2018.
3. William Stallings, "Data and Computer Communication", Pearson Education, 10th Edition, 2018.

PROGRMME OUTCOMES (PO's) 3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak								
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	1	2	-	-	-	1
CO2	2	3	2	2	1	-	-	1
CO3	2	3	3	2	-	-	-	2
CO4	2	2	2	3	-	-	-	2
CO5	2	2	3	3	2	1	1	2

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. Demonstration 4. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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24CA1202	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

1. To apply the fundamentals of data models, relational algebra and SQL in new database design
2. To create database system using ER diagrams and to learn normalization techniques
3. To analyze the fundamental concepts of transaction, concurrency and recovery processing
4. To analyze the internal storage structures using different file and indexing techniques which will help in physical DB design
5. To have an introductory knowledge about the Distributed databases, NOSQL and database security

Pre Requisite **Basic Skills in programming concepts**

UNIT I INTRODUCTION

Database & Database Users. Characteristics of the Database Approach advantages of usine DBMS. Data Models, Schemas & Instances. DBMS Architecture & Data Independence. System Architecture for DBMS and Data Dictionary, Database Users Data Base languages & Interfaces. Data Modeling using the Entity-Relationship Model -Entity types, Entity Sets, Attributes and Keys, Relationship, Relationship Types, Week Entity Types, Structural Constraints, Enhanced ER Model- Specialization Generalization, Constraints on Specialization Generalization - Data flow diagram. **9**

UNIT II RELATIONAL MODEL, LANGUAGES & SYSTEMS

Relational Data Model Concepts and Constraints. Relational Algebra - select, project, set theoretic, join operations. Overview of Relational Calculus. SQL - A Relational Database Language. Data Definition commands, View and Queries, transaction commands, Specifying Constraints & Indexes in SQL **9**

UNIT III DATABASE DESIGN

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form **9**

UNIT IV TRANSACTIONS, CONCURRENCY CONTROL, RECOVERY TECHNIQUEs

Basic concept; ACID properties; transaction state; implementation of atomicity and durability-- concurrent executions; basic idea of serializability - view and conflict serializability Recovery Techniques Failure Classification - Storage Structure - Recovery and Atomicity Log Based Recovery - Shadow Paging - stable storage implementation - data access; recovery and atomicity - log based recovery, deferred database modification- immediate database modification-checkpoints. **9**

UNIT V EMERGING FIELDS IN DBMS

Distributed databases; Basic idea-distributed data storage- data replication- data fragmentation horizontal, vertical and mixed fragmentation. Concepts of Multimedia databases - Object oriented data base management systems - Data Warehousing & mining. **9**

Theory Hours : 3 **Tutorial Hours : 0** **Practical Hours : 0** **Total Hours: 45 Hrs**

COURSE OUTCOME

CO1. Construct SQL Queries using relational algebra
CO2. Design database using ER model and normalize the database

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CO3. Construct queries to handle transaction processing and maintain consistency of the database.

CO4. Compare and contrast various indexing strategies and apply the knowledge to tune the performance of the database

CO5. Appraise how advanced databases differ from Relational Databases and find a suitable database for the given requirement.

REFERENCES:

1. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, McGraw Hill, 2020.
3. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2017

PROGRMME OUTCOMES (PO's) **3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak**								
CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	1	2	-	-	-	1
CO2	3	3	2	3	1	-	-	1
CO3	2	3	2	2	1	-	-	1
CO4	2	3	2	3	1	-	-	1
CO5	2	3	2	3	1	1	1	2

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. Demonstration 4. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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24MA1105	PROBABILITY AND STATISTICS FOR DATA ANALYTICS	L	T	P	C
		3	0	2	4

COURSE OBJECTIVE

1. To construct a well-defined knowledge of Probability.
2. To interpret measures of central tendency, dispersion, and association.
3. To introduce Correlation concepts to understand the relation between two random variables.
4. To describe some basic concepts of statistical methods for testing the hypothesis.
5. To educate the design of experiment techniques to solve various engineering problems

Pre Requisite **Strong Foundation in calculus, matrix algebra, and experience in programming**

UNIT I PROBABILITY

Definition – Axioms of Probability – Conditional Probability – Total Probability – Baye's Theorem (without proof). 6

UNIT II DESCRIPTIVE STATISTICS

Collection of Data-Classification-Tabulation-Graphical Representation – Simple Bar Chart – Pie Chart - Measures of Central Tendency - Mean – Median –Mode, Measures of Dispersion - Range – Quartile Deviation – Standard Deviation – Coefficient of Variation. 9+6

Introduction to R Studio Programming - R Lab: Mean Median Mode, Standard Deviation & Variance

UNIT III CORRELATION AND REGRESSION

Correlation – Karl Pearson's correlation coefficient – Spearman's Rank Correlation – Regression lines (problems based on Raw data only). 9+3

R Lab: Correlation & Regression

UNIT IV HYPOTHESIS TESTING

Large sample test - Test of significance for single mean and difference of means -Small sample test – t test for single mean and difference of mean - F test for variance, Chi – Square test for independence of attributes. 9+3

R Lab: t - Test, F - Test & Chi Square Test

UNIT V ANALYSIS OF VARIANCE

Introduction- - Completely Randomized Design-Randomized Block Design - Latin Square Design. 9+3

R Lab: Analysis of Variance

Theory Hours : 3 **Tutorial Hours : 0** **Practical Hours : 2** **Total Hours: 60 Hours**

COURSE OUTCOME

CO1. Understand the concepts of probability.
CO2. Understand the concepts of Descriptive Statistics
CO3. Compute correlation and predict unknown values using regression.
CO4. Classify the statistical methods of testing the hypothesis.
CO5. Apply Design of Experiment techniques to solve various engineering problems.

TEXT BOOKS:

T1 Veerarajan, T., Probability, Statistics and Random Processes, Tata McGraw-Hill, 2nd Edition, New Delhi, April 19, 2017

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T2 Gupta S C and kapoor V.K, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 2016.
T3 Medhi J," Stochastic Processes", New Age International Publishers, New Delhi, 2014.

REFERENCE BOOKS :

R1- Gareth M. James, Daniela Witten, Trevor Hastie, Robert Tibshirani, An Introduction to Statistical Learning: With Applications in R, 2017
R2 - Walpole. R.E., Myers. R.H., Myers. S.L., and Ye. K., "Probability and Statistics for Engineers and Scientists", 10th Edition, Pearson Education, Asia, 2012.

PROGRMME OUTCOMES (PO's) 3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak								
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	3	3	3	1	-	-	1
CO2	3	3	3	3	1	-	-	-
CO3	3	3	3	2	1	1	-	-
CO4	3	3	3	3	1	1	-	1
CO5	3	3	3	3	1	1	-	1

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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24CA1203	JAVA PROGRAMMING	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE

1. To impart the fundamental concepts of core JAVA.
2. To explain the concepts of Multithreading
3. To explore the skills in program development using Exception handling and I/O programming
4. To gain the built-in knowledge of standalone and web applications.
5. To understand the concepts needed for database connectivity.

Pre Requisite **Familiarity with programming language such as C/C++, data structures and algorithms.**

INTRODUCTION

Introduction –JDK Installation and Path Specification - Java Application Structure - Data types – Variables – Arrays – Operators - Control Structures– Class – Objects – Methods – Overloading Methods - Constructors – "This" keyword - Garbage Collection. 12

OOPS

Nested classes – Inheritance – Using super keyword - Access specifier- Encapsulation- Interface-Polymorphism– Multi Level hierarchy – Method Overriding - Dynamic Method Dispatch – The Object class – Abstract classes -Package. 12

EXCEPTION HANDLING & THREADS

Exception handling – Using try catch – Nested try- throw – throws – finally – Built in exceptions – user defined exceptions - Threads – Thread model – Creating a thread – Thread priorities – Synchronization – Multithreading – String Handling – Tokenizer – Wrappers. 12

AWT, FRAMES& APPLETS

AWT controls - Frames – Applet structure – HTML Applet Tag – Event Handling -Event Listeners - Applet Programming. 12

FILES & DATABASES

Networking – RMI- I/O streams – Reading/Writing console – Files - Manipulating Databases with JDBC – Java Collections. 12

Theory Hours : 3 **Tutorial Hours : 1** **Practical Hours : 0** **Total Hours: 60 Hrs**

COURSE OUTCOMES

CO1. Create applications using classes and objects
CO2. Design new applications by applying reusability and Packages concept
CO3. Apply Multithreading concepts to execute parallelism Exception handling.
CO4. Solve programs using Frames, Event handlers and Applets
CO5. Compute rich applications using I/O, Files, JDBC and System/Utility classes

REFERENCES

R1- Herbert Schildt, "JAVA - The Complete Reference", twelth Edition 2021, McGraw-Hill Education,
R2- Rashmi Kanta Das, "Core Java for Beginners", Third Edition, First Reprint 2015, Vikas Publishing House Pvt Ltd, ISBN – 978-93259-6850-9.
R3-Deitel, Deitel," Java How To Program, Late Objects, Global Edition", PHI, 2019

PROGRMME OUTCOMES (PO's) 3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak								
CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	1	3	1	-	-	1

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CO2	3	2	2	3	2	-	-	1
CO3	3	2	3	3	2	-	-	2
CO4	3	2	3	3	2	-	-	2
CO5	3	2	3	3	2	1	1	2

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. Demonstration 4. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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24CA1204	RESEARCH METHODOLOGY, IPR AND TECHNICAL PRESENTATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

1. Apply critical thinking skills to define research objectives, identify gaps in existing literature, and formulate hypotheses to address research problems effectively.
2. Analyze different data collection methods, apply sampling techniques, and evaluate data pre-processing strategies to ensure the reliability and validity of research data.
3. Evaluate statistical analysis techniques, interpret research findings accurately, and synthesize results to draw meaningful conclusions and recommendations.
4. To critically analyze and apply the principles and legal frameworks of Intellectual Property Rights (IPR) and patents in real-world scenarios.
5. To develop the ability to critically evaluate, synthesize, and present advanced research findings through technical seminars and publications.

Pre Requisite **Skills to read and comprehend technical research paper.**

UNIT I RESEARCH PROBLEM FORMULATION — 6

Definition and Motivation - Objective of Research - Steps in Research Process; Characteristics of Good Research - Ethics in Research - Types of Research - Research Approaches, Problem Definition and Formulation - Hypothesis - Literature Review -
Identifying research gaps.

UNIT II DATA COLLECTION — 9

Sampling – Sampling Techniques – Sampling error - Primary and Secondary Data - Data Collection Methods – Data Preprocessing – Data Validation and its types - data presentation- types of tables and illustrations.

UNIT III DATA ANALYSIS, INTERPRETATION AND REPORTING (12) — 12

Method vs methodology - test of hypothesis - measures of central tendency and variation - Data Analysis- Statistical Analysis; Multivariate Analysis; Correlation Analysis; Regression Analysis; Principle Component Analysis.

Guidelines for writing Journal and Thesis: Abstract, introduction, methodology, results and discussion, conclusion, Bibliography and References – Appendix - plagiarism, Citation and listing system of documents - Styles and methods

UNIT IV IPR AND PATENTS — 9

IPR - Concept of IPR, types of IPR – Patent, Designs, Trademarks and Trade secrets, Geographical indications, Copy rights, types and features of IPR agreement.

PATENTS - Law of Patents, Patent Searches, Ownership, Transfer Patentability Design Patents- Double Patenting – Assignment of Patent Rights – Patent Application Process – Prosecuting the Application, Term and Maintenance of Patents. Ownership Rights – Sole and Joint Inventors - Licensing of Patent Rights - Patent Infringement, New Developments in Patent Law

UNIT V TECHNICAL SEMINAR / TECHNICAL PUBLICATIONS (9) — 9

Importance and objectives of technical seminars and publications - Types of technical publications: journals, conferences, white papers, technical reports - Structure of a research paper – Technical paper writing - understanding the peer review process and publication.

Students should independently read and comprehend research papers, conduct thorough literature reviews, and identify key components and trends in their field of study. They should present their findings clearly to a review team, ensure academic integrity through plagiarism checks, and successfully submit manuscripts for publication.
– technical presentation – Submitting manuscript for right journal or conference for publication.

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Theory Hours : 45 **Tutorial Hours : 0** **Practical Hours : 0** **Total Hours: 45**

COURSE OUTCOME

CO1. Evaluate research objectives critically, synthesize information from literature reviews to identify gaps in knowledge, and formulate clear and testable hypotheses.
CO2. Demonstrate the ability to assess the appropriateness of data collection methods, justify sampling techniques, and implement data preprocessing steps effectively.
CO3. Applying statistical analysis methods, interpreting complex data sets, and synthesizing research findings coherently
CO4. Evaluate and manage complex IPR and patent-related issues, including searches, ownership, licensing, and infringement, while integrating the latest developments in patent law.
CO5. Proficiently create, review, and submit high-quality research papers, demonstrating a deep understanding of their field and adherence to academic and ethical standards.

REFERENCES

1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 11e (2012).
2. Soumitro Banerjee, "Research methodology for natural sciences", IISc Press, Kolkata, 2022,
3. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013.

PROGRMME OUTCOMES (PO's) 3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak								
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	2	2	-	-	2	2
CO2	3	2	2	2	-	-	2	2
CO3	3	2	3	2	-	-	2	2
CO4	3	2	3	2	-	-	2	2
CO5	3	2	3	2	-	-	2	2

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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24CA1251	WEB TECHNOLOGY	L	T	P	C
		3	0	2	4

COURSE OBJECTIVE

1. Gain Knowledge in the basics of world wide web and HTML
2. Get equipped both CSS and JavaScript, enabling them to build interactive websites.
3 Comprehensive understanding of advanced JavaScript techniques and DOM manipulation
4 To make use of JS Libraries and Framework to create applications
5. To design and develop backend components using Node JS

Pre Requisite **Nil**

UNIT I - HTML

Internet Standards – Introduction to WWW – WWW Architecture – SMTP – POP3 – File Transfer Protocol - Overview of HTTP, HTTP Request – Response – Web Server and its type - Introduction HTML – HTML Elements – Semantics – Attributes –Headings-Paragraph-Styles – Tables – forms-Formatting – Quotations – Computer Code- Comments & Colors- HTML CSS– Links & Images –Lists-Classes-Layout. **12**

1. ***You have been hired as a web developer by an educational institution to create a comprehensive and informative multi-page HTML website.The website should include multiple pages, each showcasing different aspects of the institution. You need to use a variety of HTML elements such as headings, paragraphs, and styles to create a structured and engaging layout. Emphasize the use of semantic HTML to enhance accessibility and improve SEO, ensuring that search engines can easily index the content.***

UNIT II – CSS & JAVASCRIPT

Cascading Style Sheet (CSS3): The Need for CSS – Basic Syntax and Structure Inline Styles – Embedding Style Sheets - Linking External Style Sheets – CSS fundamentals: Syntax- Ruleset: Styling Techniques : Backgrounds - Manipulating text - Margins and Padding - Positioning Using CSS -Responsive Web Design- CSS Animation – Css CSS Preprocessor Javascript Fundamentals : JavaScript Basics - Control Flow Statements - Loops - Expression and Operators - Objects - Functions.

2. ***Create a web page with the following deliverables***

- ***Home Page:***
  - *Create a visually appealing home page that includes a background image or color, styled text, and well-spaced sections using margins and padding.*
  - *Use embedded style sheets to define the CSS rules for this page.*
- ***About Us Page:*** **12**
  - *Develop an "About Us" page that uses an external style sheet linked to the HTML.*
  - *Apply various text manipulation techniques to improve readability and presentation.*
- ***Programs Page:***
  - *Design a "Programs" page that demonstrates CSS positioning techniques to organize content effectively.*
  - *Include a responsive layout that adapts to different screen sizes.*
- ***Contact Page:***
  - *Create a "Contact" page that includes a form styled using CSS.*
  - *Implement animations to enhance user interaction (e.g., button hover effects, form field focus animations).*
- ***CSS Preprocessor Implementation:***
  - *Show the use of* a CSS preprocessor by including the preprocessed CSS code and the generated CSS file.

UNIT III – ADVANCED JAVASCRIPT

Regular Expression - Events - OOPs - Inheritance and Prototype Chain - Memory Management - - Promises - Iterators and generators - Validations - Exception Handling - Global Objects -JS this Keyword - Strict Mode - setTimeOut() and setInterval() Method - typeOf Operator - Debugging - Local Storage - Callback - Closures - JS defer - scope - Void. JavaScript DOM Manipulation: Manipulating the DOM with **12**

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JavaScript - Handling events and user interactions with JavaScript- Debugging and troubleshooting JavaScript code.

3. ***Developing an Interactive Student Management System Using JavaScript Fundamentals. The system should have the following deliverables given below***
   1. ***Add Student Functionality:***
      - *Create a form in HTML to input student details (ID, name, age, grade, contact).*
      - *Write a JavaScript function to validate and add the student object to an array.*
   2. ***View Students:***
      - *Develop a function to display all student records in a structured format.*
      - *Use loops to iterate through the array of student objects and output their details to the console or webpage.*
   3. ***Update Student:***
      - *Implement a function to update a student's details.*
      - *Use control flow statements to search for the student by ID and update the relevant fields.*
   4. ***Delete Student:***
      - *Write a function to delete a student record based on a unique identifier (e.g., student ID).*
      - *Use array methods and loops to find and remove the student object from the array.*
   5. ***Search Student:***
      - *Implement a search functionality that allows users to find a student by name or ID.*
      - Use loops and control flow statements to match the search criteria and display the result.

UNIT IV - JAVASCRIPT LIBRARIES AND FRAMEWORKS

Introduction to ES6 - Introduction to TypeScript - Key Features of TypeScript - Structure of TypeScript – Need for Typescript - JavaScript Libraries: JQuery, Json : Introduction – Data types – Schema – Javascriot Json.

4. ***Developing a Contact Management System with DOM Manipulation and Advanced JavaScript Features***

You are required to build a Contact Management System where users can add, edit, delete, and search for contacts. The application should utilize advanced JavaScript features for effective DOM manipulation, event handling, and data validation.

Develop the Contact Management System with the following features:

- *Add new contacts with validation.*
- *Edit existing contacts.*
- *Delete contacts.*
- *Search for contacts.*
- *Validate contact details using regular expressions.*
- *Use DOM manipulation to dynamically update the contact list.*
- *Store contacts in the local storage for data persistence.*
- *Handle errors gracefully and provide user feedback.*
- *Implement asynchronous operations with callbacks and promises.*
- *Use closures to manage private data within functions.*
- *Apply the this keyword and strict mode correctly.*
- *Use setTimeout() and setInterval() for timed operations.*
- *Debug and troubleshoot the code effectively.*
- *Integrate CSS for a responsive and user-friendly interface.*

12

Express and NODEJS

Express JS Express - Restful Services - Introducing Express - Building Your First Web Server - Nodemon - Environment Variables - Route Parameters – **NODEJS** : Introduction – Installation – Console – Repl Commands – Package Manager – Command Line Options – Functions - Global Objects – Timer – Error Handling – Dns – Callbacks – Events – Web Module – Node.js Mysql - RESTful API.

12

5. ***Building a RESTful Web Service for a Bookstore***

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You have been hired to develop a RESTful web service for a bookstore using Express.js. The web service should manage a collection of books, allowing users to perform CRUD (Create, Read, Update, Delete) operations. To enhance development efficiency, you will use Nodemon for automatic server restarts and environment variables to manage configuration settings. The service should also handle route parameters for specific operations. Create code snippets for the following

- ***Setup and Initialization:***
  - *Initialize a new Node.js project.*
  - *Install Express.js and Nodemon.*
  - *Create the main application file (e.g., app.js).*
- ***Creating the Server:***
  - *Set up an Express server that listens on a port specified in environment variables.*
  - *Use Nodemon to automatically restart the server during development.*
- ***Environment Variables:***
  - *Create a .env file to store environment variables.*
  - *Use the dotenv package to load environment variables into your application.*
- ***Routing and CRUD Operations:***
  - *Define routes for the following endpoints:*
    - *POST /books: Add a new book to the collection.*
    - *GET /books: Retrieve a list of all books.*
    - *GET /books/:id: Retrieve a specific book by ID.*
    - *PUT /books/:id: Update the details of a specific book by ID.*
    - *DELETE /books/:id: Delete a specific book by ID.*
- ***Handling Route Parameters:***
  - *Use route parameters to handle operations on specific books.*
  - *Implement middleware to validate and process route parameters.*
- ***Error Handling and Responses:***
  - *Implement error handling to manage cases where a book is not found or input data is invalid.*
  - *Return appropriate HTTP status codes and response messages for each operation.*
- ***Testing and Documentation:***
  - *Test all endpoints using a tool like Postman or curl.*
  - *Document the API endpoints and their usage.*

Theory Hours : 3	**Tutorial Hours :0**	**Practical Hours : 2**	**Total Hours: 60 Hours**

COURSE OUTCOME

CO1. Demonstrate the knowledge of fundamental elements and concepts related to Web clients and servers
CO2. Design Static Client Side web documents using markup languages and style sheets
CO3. Design and Implement interactive Websites using client-side scripting.
CO4. Design application using JavaScript Libraries and Frameworks
CO5. Implement Web Applications using Express and Node JS

REFERENCES

1. "Internet & World Wide Web: How to Program" by Paul Deitel, Harvey Deitel, Abbey Deitel, Pearson, 5th Edition, 2018
2. "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics" by Jennifer Robbins. 2018
3. "CSS: The Definitive Guide", Eric A. Meyer, O'Reilly Media, 4th Edition, December 2017.
4. "JavaScript: The Definitive Guide", David Flanagan, O'Reilly Media, 7th Edition, June 2020,
5. "Programming TypeScript" by Boris Cherny, Boris Cherny, O'Reilly Media, 1st Edition, May 2019.
6. "Node.js, Express, and MongoDB Development" by Brad Dayley, Brendan Dayley, Caleb Dayley
7. Addison-Wesley Professional, 2nd Edition, October 2020

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PROGRMME OUTCOMES (PO's) 3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak								
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	1	2	-	-	-	1
CO2	3	2	2	3	-	-	-	1
CO3	3	2	3	3	1	-	-	1
CO4	3	3	3	3	2	-	-	2
CO5	3	3	3	3	2	1	2	2

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. Demonstration 4. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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24CA1001	DATABASE MANAGMENT SYSTEM LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVE

1. To create ER and DFD diagrams for Real World problem.
2. To analyse conceptual understanding of database management system
3. To apply how a real world problem can be mapped to schemas
4. To create knowledge of different applications using SQL, PL/SQL.
5. To create the programs using transactions and transaction processing

Pre-requisite : Basic Knowledge in Programming

S.no	Description of the experiments	practical hours
1	Draw ER Diagram for an Application.	6
2	Construct DFD for an Application.	6
3	Execute a DDL, DML, DCL and TCL commands for a Table	3
5	Execute SQL Functions	3
6	Execute various Joins and Sub Queries	3
7	Given an Scenario, Apply Normalization at all levels.	6
8	Write PL/SQL Procedure for an application using Exception Handling	3
9	Write PL/SQL Procedure for an application using Cursors.	3
10	Write a PL/SQL program for an application using Functions.	3
11	Write a PL/SQL block for transaction operations of a typical application using Triggers	3
12	Case Study using any of the real life database applications from the following list • Inventory Management for a E Mart Grocery Shop • Society Financial Management ● Build Entity Model diagram. The diagram should align with the business and functional goals stated in the application. ● Apply Normalization rules in designing the tables in scope. ● Prepared applicable views, triggers (for auditing purposes), functions for enabling enterprise grade features. ● Build PL SQL / Stored Procedures for Complex Functionalities, ex EOD Batch Processing for calculating the EMI for Gold Loan for each eligible Customer.	6
	Total Instructional hours	**45**

COURSE OUTCOME

CO1. Able to Construct ER and DFD Diagram.
CO2. Ability to formulate SQL queries and PL/SQL based on the problems given.
CO3. Ability to Implements Joins and Subqueries.
CO4. Ability to Normalize the database.
CO5. To create database functionalities for any real time applications.

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PROGRMME OUTCOMES (PO's)								
3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak								
CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	2	3	-	-	-	1
CO2	3	3	2	3	-	-	-	1
CO3	3	3	2	3	-	-	-	1
CO4	3	3	2	3	-	-	-	1
CO5	3	3	3	3	2	1	1	2

COURSE ASSESSMENT METHODS			
DIRECT	1. Demonstration 2. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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24CA1002	JAVA PROGRAMMING LAB	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVE

1. To apply the object concepts, array of objects, control structure and constructor in Java programs.
2. To build programs to learn inheritances, interface, packages, applets and graphics
3. To construct programs to use exceptions and handle various events.
4. To develop programs to apply i/o concepts, multithreading and access database from GUI.
5. To implement applets in real world applications

Pre-requisite : Basic Knowledge in Programming and OOPs Concepts

S.no	Description of the experiments	practical hours
	OBJECT, ARRAYS, CONTROL STRUCTURE AND CONSTRUCTOR	
1	a. Write a program to calculate employee payroll using arrays and structures. Create 2 classes to perform payroll calculation and for input and output display. Based on basic pay create array to calculate HRA, DA, MA, PF and net pay. b. Write a program for complex number operation using constructors	3
	INHERITANCE	
2	Give an array of size N which contains the marks of a student in N subjects, the task is to calculate the CGPA of the student. Write a program for marksheet preparation using 3 classes to get, calculate and display mark statement using inheritance. Note: Consider all marks to be out of 100 for each subject.	3
	INTERFACE AND PACKAGE	
3	a. Create an interface for declaring variables and methods and create two classes for performing calculation and execution to find voter eligibility. b. Create a package for flat water maintenance bill, import the package in a class file to get input and display the final detailed bill. Note: Calculate water bill based on water consumption as given below: Rate (Rs/m^3), Charges (Rs) Usage (m^3), for 0 - 20 m^3 -> Rs.0.50/-, for 21 - 35 m^3->Rs.0.90/-, for > 35 m^3->Rs.1.30/-	3
	OVERLOADING, OVER-RIDING AND MULTITHREADING	
4	a. Write a program to calculate the area of square, rectangle and triangle. Create a method area, perform method over riding and overloading using the method area. b. Write a program to display 16 times tables up to 16 using multithreading	3
	USER-DEFINED AND PRE-DEFINED EXCEPTION HANDLER	
5	a. A company consists of 1000 employees over 50 years. Each employee is assigned with unique id number up to 1000. Write a program to check the details of the employee using employee id. Generate user-defined exception handler if the employee id is not in the database. b. Create build-in exceptions using try and catch block. Arise exception in try block and handle the build-in exception in catch block. Execute the exception code in separate class to check arithmetic exception, array index out of bound exception, negative array size exception and number format exception.	6
	STRING CLASS AND STRING TOKENIZER	
6	Get strings as input. Use switch statements to select the string functions like insert, append, delete, concatenate, find and replace. Read input and perform the actions using string buffer functions. Get multiple statements as string input. Use full stop as String tokenizer. Using while loop count the tokens and display the string in separate line by sorting the string.	6
7	**FILES AND STREAMS**	3

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	Assign a variable to receive the units of electricity consumed, the task is to calculate the electricity bill using Files and streams, provided 1 to 100 units – Rs.10/unit, 100 to 200 units – Rs.15/unit, 200 to 300 units – Rs.20/unit and above 300 units – Rs.25/unit.	
	VECTOR AND WRAPPER CLASS	
8	A cone shaped tank is used to store water with 9 feet height and 14 feet diameter. Calculate the volume using vector and wrapper class by providing input values during run time, round off the values if needed and use pi=3.14. Formula to calculate volume is $v=1/3*pi*r^2*h$	3
	NETWORKING OPERATION	
9	Create a client port, server port, buffer size and datagram socket. Connect both ports in two different command prompts and interchange text message between both the ports	3
	AWT CONTROLS	
10	Use applet viewer to get personal details using text box for receiving name, check box group for gender details, text box with scroll bar for address details, List for qualification details, Choice option for country details and button to submit details. Using ActionListener() add the details and print the details.	3
	APPLET & FRAMES	
11	Create a class mouse extendapplet implementing MouseListener, MouseMotionListener. Override both methods using action commands performed by mouse events and print the mouse events like mouse pressed, released, clicked, dragged, moved, entered and exited. Create a class KeyEvent extend Applet implementing KeyListener. Override both method using action commands performed by key events and print keyboard events like pressed, released and typed. Create class using frame concept implementing WindowListener() and MouseListener()	6
	DATABASE	
12	Create an Oracle or MySQL or SQL Server database that gets inserted, updated and deleted of a person's Aadhaar records when it is invoked in a GUI form to do so.	3
	Total Instructional hours	**45**

COURSE OUTCOME

CO1. Create object for the class and to input the values during run time.
CO2. Write programs in inheritance and achieve reusability. Moreover, to implement interface, package, applet and graphics
CO3. Develop programs to understand built in exception and custom exception.
CO4. Construct programs in I/O Stream classes and threads, as well to connect databases.
CO5. Extend client with server programs using network operations.

PROGRMME OUTCOMES (PO's)
3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	3	1	-	-	1
CO2	3	3	2	3	2	-	-	1
CO3	3	2	2	3	1	-	-	1
CO4	3	3	3	3	1	-	-	1
CO5	3	3	3	3	2	1	1	2

COURSE ASSESSMENT METHODS

DIRECT	1. Demonstration 2. End Semester Examination	**INDIRECT**	3. Course Exit Survey

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DETAILS OF REVISED CURRICULUM & SYLLABUS

CBCS PATTERN

POSTGRADUATE PROGRAMMES

MCA. COMPUTER APPLICATIONS (PG)

REGULATION-2020

(For the students admitted during the academic year 2023-2024)

BATCH 2023 – 2025

SEMESTER III

S.No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	21CA3207	Deep Learning & Data Visualization	IC	3	1	0	4	40	60	100
2.	21CA3208	Ethics in Computing	PC	3	0	0	3	40	60	100
3.	21CA3209	Artificial Intelligence	EEC	3	0	0	3	40	60	100
4.	21EC3251	Internet of Things(T + L)	PC	2	0	2	3	50	50	100
5.	21CA3252	Cryptography and Network Security(T + L)	PC	3	0	2	4	50	50	100
6.	21CA33XX	Professional Elective - II	PE	3	0	0	3	40	60	100
PRACTICAL										
7.	21CA3001	Mini Project Lab	EEC	0	0	3	1.5	60	40	100
8.	21CA3004	Deep Learning and Data Visualization Lab	EEC	0	0	3	1.5	60	40	100
			Total	**17**	**1**	**10**	**23**	**440**	**360**	**800**

PROFESSIONAL ELECTIVE II										
1	21CA3301	Accounting and Financial Management	PE	3	0	0	3	40	60	100
2	21CA3303	Soft Computing Techniques	PE	3	0	0	3	40	60	100
3	21CA3305	E- Commerce	PE	3	0	0	3	40	60	100
4	21CA3306	Mixed Reality	PE	3	0	0	3	40	60	100
5	21CA3307	Organizational Behavior	PE	3	0	0	3	40	60	100
6	21CA3309	Semantic Web Services	PE	3	0	0	3	40	60	100
7	21CA3310	Cloud Computing	PE	3	0	0	3	40	60	100

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DEPARTMENT OF COMPUTER APLICATIONS

SYLLABUS REVISION DETAILS FOR THE REGULATION 2020 – ACADEMIC YEAR 2024-25 ODD SEMESTER

S.NO	COURSE CODE/COURSE NAME	SUGGESTION BY EXPERTS	EXISTING CONTENT (IN THE AY2023-24 ODD) - R2020	REVISED CONTENT(FOR AY 2024-25 ODD) – R2024	TYPE OF REVISION DELETION/INSERTION/ MODIFICATION	PERCENTAGE OF REVISION
1	21CA3252 – Cryptography and Network Security	Suggestions to revise the syllabus.	**INTRODUCTION** **Unit-1: Introduction** - Security trends – Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of network security – Security attacks, services and mechanisms – OSIsecurityarchitecture–Classical encryption techniques: substitution techniques, transposition techniques, steganography-Foundations of modern cryptography: perfect security–information theory–product cryptosystem–cryptanalysis.	**UNIT 1: CRYPTOGRAPHY - CONCEPTS AND TECHNIQUES** Need for Security - Security Approaches - Principles of Security - Plain Text and Cipher Text - Substitution Ciphers - Ceaser Cipher - Hill Cipher - Encryption and Decryption - Symmetric and Asymmetric Key Cryptography – Steganography. 1. *Write a program to perform encryption and decryption using the following algorithms:* *a. Ceaser Cipher b. Substitution Cipher* *c. Hill Cipher*	Content Revised	45%
			SYMMETRIC ENCRYPTION AND MESSAGE CONFIDENTIALITY Symmetric Encryption Principles, Symmetric Block Encryption Algorithms, Stream Ciphers and RC4, Cipher Block Modes of Operation, Location of Encryption Devices, Key Distribution. Public-key Cryptography and Message Authentication: Approaches to Message Authentication, Secure Hash	**UNIT II : SYMMETRIC KEY CRYPTOGRAPHY** Algebraic structures - Modular arithmetic - Congruence and matrices - Groups, Rings, Fields - Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis– Evaluation		

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			Functions and HMAC, Public-Key Cryptography Principles, Public-Key Cryptography Algorithms, Digital Signatures, Key Management.	criteria for AES – Advanced Encryption Standard - RC4 – Key distribution. 2. *Write a program to implement the DES algorithm logic* 3. *Write the RC4 logic Cryptography, encrypt the text "Hello world" using Blowfish. Create your own key.* *Write a program to implement triple DES*		
			AUTHENTICATION APPLICATIONS Kerberos, x.509 Authentication Service, Public-Key Infrastructure. Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME	**UNIT III : HASH FUNCTIONS AND SIGNATURES** Message Authentication and Hash Functions - Description of MD Hash Family - Secure Hash Algorithms - SHA-1 - Digital Signatures and Authentication Protocols - Digital Signature Standard - Process - Services - Attacks on Digital Signature - Digital Signature Schemes. 4. *Calculate the message digest of a text using the SHA-1 algorithm.* *Implement the Diffie-Hellman Key Exchange mechanism.*		
			IP SECURITY IP Security Over view, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations. Secure Electronic Transaction(SET).Network Management Security: Basic Concepts of Web Security: Web Security Considerations, Secure Socket Layer(SSL) and Transport Layer	**UNIT IV : MESSAGE AUTHENTICATION AND INTEGRITY** Threats in Networks: Vulnerability - Categories of Attack - Software Based Packet Sniffing - Impersonation - Message Confidentiality Threats - Message Integrity Threats - Website Vulnerabilities - DoS - DDoS. Network Security		

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			Security(TLS), SNMP, SNMPv1 Community Facility, SNMPv3.	Controls: Security Threat Analysis - Architecture - Encryption - Content Integrity - Strong Authentication - Access Controls - Wireless Security - Alarms and Alerts - Honeypots - Firewalls - Intruders - Intrusion Detection Systems - Types - Goals - Strengths and Limitations – Snort.		
			INTRUDERS DETECTION Intruders, Intrusion Detection, Password Management. Malicious Software: Virus and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks. Firewalls: Firewall Design Principles, Trusted Systems, Common Criteria for Information Technology Security Evaluation.	**UNIT V: SECURITY PRACTICE AND SYSTEM SECURITY** Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.		

III SEMESTER – NEW COURSES

R2020	
21CA3207	Deep Learning and Data Visualization
21CA3208	Ethics in Computing
21CA3209	Artificial Intelligence

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Regulation 2020 – Batch 2023 - 2025

Semester III – Regular Courses

21CA3207	DEEP LEARNING AND DATA VISUALIZATION	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE

1. To Analyze the fundamental concepts of deep learning, including the structure of artificial neurons and the operation of neural network models such as the Perceptron Algorithm.
2. Analyze the basic components and operations of neural networks
3. Develop and train CNN models for object detection and image processing problems.
4. Analyzing data visualization basics using Tableau.
5. Perform data manipulation and storytelling techniques in Tableau.

Pre Requisite **Foundational Understanding in Machine Learning**

UNIT 1 - BASICS

Deep Learning – History - Key facts – Biological Neuron- Artificial Neuron –- Mc Culloch Pitts Neuron, Limitations of MP Neuron – Single Layer Perceptron – Multi-Layer Perceptron – Perceptron Algorithm **12**

UNIT 2 NEURAL NETWORKS

– Basics of Neural Networks : Neurons, Output Functions – Activation Functions – Weights and Biases - Forward Propagation – Backward Propagation – Vectorization **12**

UNIT – 3 CONVOLUTION NEURAL NETWORK

Convolution Layer – Convolution Operations – Understanding CNN architecture -Building blocks of CNN and its implementation - Transfer Learning – Object Detection with CNN. **12**

UNIT – 4 DATA VISUALIZATION BASICS

Basics of Data Visualization – Data Visualization Tools – Download and Installation of Tableau – Data union and Aggregation – Data Sources – Text File, Excel, Extracting Data – Tableau Calculations – Operators , Functions, Numeric and String Calculations **12**

UNIT 5 – FILTER, CHARTS AND STORY IN TABLEAU

Data Filtering using Tableau – Basic Filters , Filter Operations, Extract Filters, Quick Filters , Sort Data – Charts in Tableau, Creating a data story in Tableau, Story Telling in Tableau **12**

Theory Hours : 3 **Tutorial Hours :1** **Practical Hours : 0** **Total Hours: 60**

COURSE OUTCOME

CO1. Able to implement the Perceptron Algorithm and analyze its performance in binary classification tasks, demonstrating proficiency in applying foundational concepts of neural networks to solve real-world problems.

CO2. Develop a Neural Network for a given application.

CO3. Implementing convolutional neural networks (CNNs) for various computer vision tasks, including image classification, object detection, and feature extraction.

CO4. Explore and analyze data using Tableau, creating visualizations that communicate insights effectively.

CO5. Effectively communicate data insights through interactive filtering, chart selection, and a cohesive narrative built within Tableau's storyboarding features.

1. Deep Learning, Ian Goodfellow, Yoshua Bengio, and Aaron Courville, MIT Press, 2016.
2. Deep Learning for Computer Vision, Rajalingappaa Shanmugamani, Packt Publishing, 2020

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3. Deep Learning with TensorFlow and Keras- Build and Deploy Supervised, Unsupervised, Deep, and Reinforcement Learning Models, Amita Kapoor, Antonio Gulli, Sujit Pal, Packt Publishing, 2022.
4. Clous O. Wilke, Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures, O'Reilly Media, Inc.", 18-Mar-2019.
5. Joshua N. Milligan, Learning Tableau 2020: Create effective data visualizations, build interactive visual analytics, and transform your organization, 4th Edition 4th ed. Edition, 2020
6. Visual Analytics with Tableau By Alexander Loth, Wiley Publisher, 2019.
7. Prachi Manoj Joshi, Parikshit Narendra Mahalle, Data Storytelling and Visualization with Tableau: A Hands-on Approach, CRC Press, 2023.

PROGRMME OUTCOMES (PO's) 3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	1	--	--	-	--	1	2	1	1
CO2	3	3	2	2	1	1	-	--	-	1	-	1
CO3	3	3	3	2	2	1	1	1	-	1	-	-
CO4	3	2	2	1	2	1	1	1	3	1	-	-
CO5	3	2	2	1	2	1	1	1	3	1	-	1

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Group Presentation 3. Blended Learning 4. Demonstration 5. Cross Word Puzzle 6. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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21CA3208	ETHICS IN COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

1. knowledge, skills, and ethical awareness necessary to navigate the complex ethical landscape of the digital age responsibly and ethically.
2. To analyze and address computer crime and intellectual property issues effectively, and
3. knowledge, skills, and ethical awareness to navigate complex privacy and freedom of expression issues, advocate for digital rights, and engage in informed debates on privacy and free speech in society.
4. Knowledge to navigate ethical and legal challenges in the context of social networking and online communication.
5. skills and knowledge to identify, evaluate, and address ethical issues in IT organizations, fostering a culture of ethical awareness and responsibility.

Pre Requisite **Nil**

UNIT I INTRODUCTION TO COMPUTER ETHICS **7**

Definition of Ethics - Ethics in Business World- IT Professionals - IT Users

UNIT II ASPECTS OF COMPUTER CRIME AND INTELLECTUAL PROPERTY RIGHTS **10**

Types of Exploits and Perpetrators– Implementing Trustworthy Computing- Intellectual Property Rights – Copyrights– Patents- Trade Secrets- Key Intellectual Property Issues

UNIT III PRIVACY AND FREEDOM OF EXPRESSION **10**

Privacy Protection and Law – Privacy and Anonymity Issues- First Amendment Rights – Freedom of Expression: Key Issues

UNIT IV SOFTWARE DEVELOPMENT AND SOCIAL NETWORKING **10**

Software Development – Strategies for Engineering Quality Standards–Software Product Liability – Key Issues in Software Development- Social Networking –Business Applications of Online Social Networking– Social Networking Ethical Issues – Online Virtual World.

UNIT V ETHICS OF IT ORGANIZATIONS **8**

Ethical Issues for Organizations- Contingent Workers –Outsourcing – Whistle Blowing – Green Computing - ICT Industry Code of Conduct

Theory Hours : 3 **Tutorial Hours :0** **Practical Hours : 0** **Total Hours: 45**

COURSE OUTCOME

CO1. Examine situations and to internalize the need for applying ethical principles, values to tackle with various situations.
CO2. Express the aspects of computer crime, code of ethics and standards of computer professionals.
CO3. Show a responsible attitude towards the use of computer as well as the technology.
CO4. Understand ethical issues in software development and social networking.
CO5. Analyze the professional responsibility and empowering access to information in the work.

REFERENCES

1. George W. Reynolds, "Ethics in Information Technology", Cengage Learning, 6th Edition,2018.
2. Sara Baase, "A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet", 4 th Edition, Prentice Hall, 2018.
3. Penny Duquenoy, Simon Jones and Barry G Blundell, "Ethical, legal and professional issues in Computing",

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Middlesex University Press, 2008.

4. Caroline Whitback, "Ethics in Engineering Practice and Research", Cambridge University Press, 2011

PROGRMME OUTCOMES (PO's) 3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	1	1		1			1			
CO2	3	2	2	1		1			2			
CO3	3	3	3	2	1	2			3	2		
CO4	3	3	3	1	1	2			3	2		
CO5	3	3	2	1	1	2			3	1		

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. Demonstration of Security Checks 4. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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21CA3209	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE

1. Knowledge about the foundational principles of AI and its applications.
2. deep understanding of advanced problem-solving techniques in AI.
3. Comprehensive understanding of inference mechanisms in First Order Logic.
4. Equip students with the skills to make complex decisions using advanced AI techniques.
5. comprehensive introduction to the field of machine learning, neural networks, deep learning and its significance in modern AI.

Pre Requisite **Basic Course in Probability and Linear Algebra**

UNIT 1: Introduction to AI :
Fundamentals of AI - Problem Solving as state Space Search - What is an AI Technique - Problem Solving as state Space Search - Uniformed Search - Heuristic Search - Informed Search - Constraint Satisfaction Problems **12**

UNIT II :
Searching AND/OR Graphs - Game Playing - Minimax _ Alpha-Beta - Introduction to Knowledge Representation - Propositional Logic - Firt Oredr Logic-I - First Order Logic -II **12**

UNIT III :
Inference in First Order Logic-I - Inference in First Order Logic-II - Answer Extraction - Procedural Control of Reasoning - Reasoning under Uncertainty - Bayesian Network - Decision Network **12**

UNIT IV :
Intrduction to planning - Plan Space Planning - Planning Graph and Graphplan - Practical Planning and Acting - Sequential Decision Problems - Making Complex Decisions **12**

UNIT V: Intrduction to Machine Learning
Learning Decisio Trees - Linear Regression - Support Vector Machines - Unsupervised Learning Reinforcement Learning - Learning in Neural Network - Deep Learning : A Brief Overview **12**

Theory Hours : 3 **Tutorial Hours : 1** **Practical Hours : 0** **Total Hours: 60**

COURSE OUTCOME

CO1. Evaluate the performance of different AI techniques in terms of their effectiveness and efficiency.
CO2. Develop systems that use logical reasoning to make decisions.
CO3. Design Decision Networks to combine probabilistic reasoning with decision-making.
CO4. Apply utility theory and decision analysis to make informed and optimal decisions.
CO5. Implement decision trees for classification and regression and Recognize the applications and impact of deep learning in various fields.

REFERENCES

1. Patrick Henry Winston, Artificial Intelligence, Third Edition, Addison-Wesley Publishing Company, 2004.
2. Nils J Nilsson, Principles of Artificial Intelligence, Illustrated Reprint Edition, Springer Heidelberg, 2014.
3. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 3rd Edition, PHI 2009.
4. Nils J. Nilsson, Quest for Artificial Intelligence, First Edition, Cambridge University Press, 2010.

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PROGRMME OUTCOMES (PO's)												
3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	3	2	3	2	3	2	1	1
CO2	3	3	3	3	3	2	2	2	-	1	-	1
CO3	3	3	3	1	3	2	2	2	-	1	-	-
CO4	3	3	3	1	3	2	2	2	-	1	-	-
CO5	3	2	2	3	3	2	2	2	-	1	-	1

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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21EC3251	INTERNET OF THINGS	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE

1. To understand the fundamentals of Internet of Things.
2. To understand the IoT design methods and their Concepts
3. To build a small low-cost embedded system using Galileo/Arduino or equivalent boards.
4. To understand the concept of advanced high power Raspberry Pi board.
5. To get an idea where the application areas are available for the Internet of Things.

Pre Requisite **A solid understanding of embedded system and sensors is needed**

Unit I - Introduction to IoT **6**
Introduction – Physical and Logical design of IoT – IoT Enabling Technologies – IoT levels and deployment templates.

Unit II - IoT Design Methodology **6**
IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

Unit III - Building IoT with Galileo/Arduino **6**
Introduction to Intel Galileo Gen2/Arduino- Interfaces - Arduino IDE – Programming

Unit IV - Getting Started with Raspberry Pi **6**
About the Board – Linux on Raspberry Pi - Interfaces - Programming Raspberry Pi with python – Examples.

Unit V - Application Development **6**
Home Automation – Cities – Environment: Weather monitoring system – Forest Fire detection – Agriculture – Productivity Applications.

Practicals

1. Introduction to Intel Galileo Gen2/Arduino Uno and LED Interfacing
2. Sensor Interfacing with Intel Galileo Gen2/Arduino Uno
3. Raspberry Pi - Introduction and installation of OS
4. Home automation using Pi
5. Using Node-RED Visual Editor on Rpi
6. IoT Applications based on Pi
7. Mini Project

Theory Hours: 2 **Tutorial Hours: 0** **Practical Hours: 2** **Total Hours: 45**

COURSE OUTCOME

CO1. Describe IoT with various tools.
CO2. Design IoT using various methodologies
CO3. Design a portable IoT using Arduino/ equivalent boards and relevant protocols.
CO4. Deploy an IoT application and connect to the cloud using Raspberry Pi.
CO5. Analyze applications of IoT in real time scenario

REFERENCES

1. Michael T. Simpson, Kent Backman, and James E. Corley, Hands-On Ethical Hacking and Network Defense, Course Technology, Delmar Cengage Learning, 2010.
2. Certified Ethical Hacker, Version 9, Second Edition, Michael Gregg, Pearson IT Certification, 2017.
3. Hacking the Hacker, Roger Grimes, Wiley 2017.

PROGRMME OUTCOMES (PO's) 3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	1	1		1			1			
CO2	3	2	2	1		1			2			
CO3	3	3	3	2	1	2			3	2		
CO4	3	3	3	1	1	2			3	2		
CO5	3	3	2	1	1	2			3	1		

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. Demonstration of Security Checks 4. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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21CA3252	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
		3	0	2	4

COURSE OBJECTIVE

1. To Apply the principles of security to develop simple cryptosystems using classical ciphers.
2. To Analyze the security required by any computing system and apply cryptography algorithms to protect the confidentiality of information resources across networks.
3. To Analyze security policies and best practices and apply suitable security technique to achieve integrity, and non-repudiation of information.
4. To Examine network security threats and vulnerabilities, then select and implement effective security measures to protect internal and external networks.
5. To Identify threats to system components and choose the most effective technique to control them.

Pre Requisite **Strong understanding of mathematical principles and Networking**

UNIT 1: CRYPTOGRAPHY - CONCEPTS AND TECHNIQUES

Need for Security - Security Approaches - Principles of Security - Plain Text and Cipher Text - Substitution Ciphers - Ceaser Cipher - Hill Cipher - Encryption and Decryption - Symmetric and Asymmetric Key Cryptography – Steganography. **12**

1. *Write a program to perform encryption and decryption using the following algorithms:*
   a. Ceaser Cipher b. Substitution Cipher c. Hill Cipher

UNIT II : SYMMETRIC KEY CRYPTOGRAPHY

Algebraic structures - Modular arithmetic - Congruence and matrices - Groups, Rings, Fields - Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis– Evaluation criteria for AES – Advanced Encryption Standard - RC4 – Key distribution. **12**

2. *Write a program to implement the DES algorithm logic*
3. *Write the RC4 logic Cryptography, encrypt the text "Hello world" using Blowfish. Create your own key.*
4. *Write a program to implement triple DES*

UNIT III : HASH FUNCTIONS AND SIGNATURES

Message Authentication and Hash Functions - Description of MD Hash Family - Secure Hash Algorithms - SHA-1 - Digital Signatures and Authentication Protocols - Digital Signature Standard - Process - Services - Attacks on Digital Signature - Digital Signature Schemes. **12**

5. *Calculate the message digest of a text using the SHA-1 algorithm.*
6. *Implement the Diffie-Hellman Key Exchange mechanism.*

UNIT IV : MESSAGE AUTHENTICATION AND INTEGRITY

Threats in Networks: Vulnerability - Categories of Attack - Software Based Packet Sniffing - Impersonation - Message Confidentiality Threats - Message Integrity Threats - Website Vulnerabilities - DoS - DDoS. Network Security Controls: Security Threat Analysis - Architecture - Encryption - Content Integrity - Strong Authentication - Access Controls - Wireless Security - Alarms and Alerts - Honeypots - Firewalls - Intruders - Intrusion Detection Systems - Types - Goals - Strengths and Limitations – Snort. **14**

UNIT V: SECURITY PRACTICE AND SYSTEM SECURITY

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls. **10**

Theory Hours : 3 **Tutorial Hours : 0** **Practical Hours : 2** **Total Hours: 60**

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COURSE OUTCOME

CO1. Apply the principles of security to develop simple cryptosystems using classical ciphers.

CO2. Analyze the security required by any computing system and apply cryptography algorithms to protect the confidentiality of information resources across networks.

CO3. Analyze security policies and best practices and apply suitable security technique to achieve integrity, and non-repudiation of information.

CO4. Examine network security threats and vulnerabilities, then select and implement effective security measures to protect internal and external networks.

CO5. Identify threats to system components and choose the most effective technique to control them.

REFERENCES

1. William Stallings, "Cryptography and Network Security - Principles and Practices", 7th Edition, Pearson Education, 2017.

2. Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill, 3rd Edition, 2017.

3. Behrouz A. Forouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata McGraw Hill, 2017.

PROGRMME OUTCOMES (PO's)												
3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	3	3	2	-	-	-	-	-	-
CO2	3	3	2	3	3	2	-	-	-	-	-	1
CO3	3	3	2	3	3	1	-	-	-	-	-	1
CO4	3	3	2	3	2	1	-	-	-	-	-	1
CO5	3	3	2	2	2	2	-	-	-	-	-	-

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. Demonstration 4. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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21CA3001	MINI PROJECT	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVE

1. Equip students with practical problem-solving skills.
2. Familiarize students with software lifecycle models and relevant artifacts.
3. Foster creativity and innovation through the development of unique projects.
4. Enhance skills in report writing, presentation, and demonstration.
5. Encourage user-based testing and gather valuable feedback from the project's benefiting society.

Pre Requisite **NIL**

Sl. No.	Description of the Experiments
1.	Students shall develop creative or innovative project.
2.	Need to submit a report, presentation with demo.
3.	User Based Testing and feedback from the benefited society required.
4.	Students can select topics from either one of the following domain • Application based or • Algorithms-based projects • Data Analysis Projects • Simulation Projects • Optimization Projects • Automation Projects • Web Development Projects • Mobile App Development Projects

Theory Hours : 0 **Tutorial Hours : 0** **Practical Hours : 3** **Total Hours: 45**

COURSE OUTCOME

CO1. Develop skill to create practical solutions to identified problem.
CO2. Use software lifecycle model and other artifacts appropriate for problem.
CO3. Identify and master tools required for the project implementation.
CO4. Plan and work systematically towards completion of a project work.
CO5. Develop the ability to explain and defend their work in front of an evaluation panel

PROGRMME OUTCOMES (PO's)												
3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	2	1	1	3	1	-	1	1
CO2	3	3	2	1	1	1	1	-	2	-	1	1
CO3	3	3	2	1	2	1	1	-	3	-	1	1
CO4	3	3	3	1	1	1	1	2	3	1	2	1

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CO5	**3**	**3**	**3**	**1**	**2**	**-**	**-**	**-**	**3**	**-**	**3**	**2**

COURSE ASSESSMENT METHODS			
DIRECT	1. Model Examination 2. Continuous Internal Assessments	**INDIRECT**	1. Course Exit Survey

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21CA3004	DEEP LEARNING AND DATA VISUALIZATION LAB	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVE

1. To evaluate and compare the effectiveness of various neural network models such as single layer perceptron and multi-layer perceptron.
2. Apply backpropagation algorithm and activation functions to train a neural network model and evaluate the impact of different activation functions on model performance.
3. To develop proficiency in designing sequential neural network models using Keras and TensorFlow for classification tasks.
4. To develop and implement a convolutional neural network (CNN) using Keras.
5. To transform data into insightful visualizations using Tableau, empowering data-driven decision making

Pre Requisite **Foundational Understanding in Machine Learning**

SINGLE LAYER PERCEPTRON

1. Analyse the performance of the Perceptron algorithm on the Sonar dataset, which consists of features extracted from sonar signals and corresponding class labels indicating whether the detected object is a "Rock" or a "Mine." Design a case study to investigate the effectiveness of the Perceptron model for binary classification tasks on this dataset. **3**

MULTI LAYER PERCEPTRON

2. A financial institution is exploring the use of deep learning techniques to authenticate banknotes and detect counterfeit currency. The organization has collected a dataset containing features extracted from images of banknotes, such as variance, skewness, curtosis, and entropy, along with a binary class label indicating the authenticity of each banknote. Implement a multi-layer perceptron (MLP) classifier using the MLP Classifier from scikit-learn with appropriate parameters, such as the number of hidden layers, activation function, and maximum number of iterations. Train the MLP model on the preprocessed training data and evaluate its performance using suitable evaluation metrics. **3**

BACK PROPAGATION

3. Designing a case study to develop and evaluate a neural network model for predicting students' test scores based on their hours of sleep and study. Utilizing the provided dataset consisting of hours of sleep, hours of study, and corresponding test scores, frame a comprehensive case study to investigate the effectiveness of the neural network model in predicting student performance. **6**

ACTIVATION FUNCTIONS

4. Initialize a dataset, Assigns weights and learning parameter. Initialize the number of Iterations and perform the following Training and Evaluate using **3**

- STEP Activation Function
- Linear Activation Function
- Sigmoid Activation Function

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• RELU Activation Function
• SOFTMAX Activation Function

NEURAL NETWORK

5. Design a sequential neural network model and train it using Keras and Tensor flow to classify the Pima Indians Diabetes dataset, and evaluate the model's accuracy and save the model for future use and load the pre trained model and interpret the results. **6**

CONVOLUTION NEURAL NETWORK

6. Design and build a convolutional neural network and train using Keras to classify the MNIST digit dataset? Evaluate the model's accuracy and visualized the performance using accuracy and loss graphs

OBJECT DETECTION

7. Perform object detection using any detector model and Open CV in python. Load the model and the camera feed processes to detect objects in real time. The detected object should be labelled and bounded by rectangle.

8. Prepare a sample data set "student_data.xlsx" containing information about student information, including: **12**

- Student Register Number
- Student Name
- Class
- Subject
- Semester
- Class Size
- Average Daily Attendance Rate
- Standardized Test Score
- Letter Grade (A, B, C, D, or F)
- Parental Involvement Level (High, Medium, Low)

Perform the Following

- Download and Install Tableau Desktop
- Understanding Data and Connecting to Tableau
- Create visualizations to compare average grades across different subjects, grade levels, or semesters. Utilize data aggregation techniques (AVG) to calculate average grades for each category.
- Analyze the relationship between factors like class size, average daily attendance, and student performance. Consider using scatter plots or correlations to explore these relationships.
- Investigate the impact of parental involvement on student achievement. Create visualizations comparing average grades or standardized test scores across different parental involvement levels.

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- Create a calculated field to identify students who might be at risk based on low grades, attendance issues, or standardized test scores. Consider setting thresholds for these factors.

Analyze the distribution of student performance across different grade levels and subjects. You can use boxplots or histograms to visualize these distributions and identify potential achievement gaps.

9. Acme Corporation, a leading manufacturer of consumer electronics, wants to gain deeper insights into their sales data. Using Tableau explore the sales performance across different regions and identify trends. 6

Region	Product ID	Category	Sub-Category	Product Name	Sales	Quantity	Discount	Profit
South	FUR-BO-10001798	Furniture	Bookcases	Bush Somerset Collection Bookcase	261.96	2	0	41.9136
South	FUR-CH-10000454	Furniture	Chairs	Hon Deluxe Fabric Upholstered Stacking Chairs, Rounded Back	731.94	3	0	219.582
West	OFF-LA-10000240	Office Supplies	Labels	Self-Adhesive Address Labels for Typewriters by Universal	14.62	2	0	6.8714
South	FUR-TA-10000577	Furniture	Tables	Bretford CR4500 Series Slim Rectangular Table	957.5775	5	0.45	-383.031
South	OFF-ST-10000760	Office Supplies	Storage	Eldon Fold 'N Roll Cart System	22.368	2	0.2	2.5164

Perform the Following

- Exploring Sales Performance
- Perform calculations on Various Applicable Fields

Perform Visualization using Various Charts

10. For students_data.xlsx perform the operations of story telling using Tableau 6

- Craft a data story with a clear narrative arc, beginning with introducing the challenge of improving math performance at Acme Middle School.
- Use your visualizations to showcase trends and relationships identified in previous sections.
- Emphasize key insights about factors influencing math performance and highlight potential areas for improvement.
- Conclude with recommendations for data-driven strategies based on your analysis. These could include differentiated instruction methods, targeted study skills workshops, or after-school tutoring programs catering to different learning styles.

Deliverables:

- A Tableau workbook (.twb) file containing the visualizations used in your data story.

A presentation or report that showcases your data story using Tableau visualizations and explains your findings and recommendations.

Theory Hours : 0 **Tutorial Hours : 0** **Practical Hours : 3** **Total Hours: 45**

COURSE OUTCOME

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CO1. Analyze the effectiveness of different neural network models, such as perceptron, multi-layer perceptron to solve various neural network problems
CO2. Synthesize findings and communicate insights gained from experimentation, demonstrating the implementation of neural network training and activation functions.
CO3. Design a sequential neural network architecture using Keras and TensorFlow for binary classification tasks.
CO4. Practical experience in training, evaluating, and visualizing CNN models, enhancing their understanding of deep learning concepts and techniques applied to image classification.
CO5. Gain proficiency in using Tableau to analyze student performance data, create compelling data stories, and explore sales trends for a business.

PROGRMME OUTCOMES (PO's) **3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak**												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	1	--	--	-	--	1	-	-	1
CO2	3	3	3	2	1	1	-	--	-	-	-	1
CO3	3	3	3	2	2	1	1	1	-	-	-	-
CO4	3	3	3	1	2	1	1	1	3	-	-	2
CO5	3	2	2	1	2	1	1	1	3	-	-	2

COURSE ASSESSMENT METHODS			
DIRECT	1. Model Examination 2. Continuous Internal Assessments	**INDIRECT**	1. Course Exit Survey

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21CA3301	ACCOUNTING AND FINANCIAL MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

1. To Enables the students to understand the basic accounting concepts and preparation of financial statements
2. To Enable the students to understand the various techniques in financial statement analysis.
3. To Enable the students to understand the analysis of fund flow and cash flow and application of cost accounting technique to ascertain the cost of products and services
4. To Enables students to understand the application of marginal costing techniques, preparation and presentation of budgets in business
5. To Expose the students to understand the concept of financial management, time value of money and investment decision on projects

Pre Requisite **NIL**

FINANCIAL ACCOUNTING **9**

Financial Accounting – Accounting Concepts and conventions - Double entry principles of book keeping - Journal entry- Ledger-Trial Balance- Final Accounts.

FINANCIAL STATEMENT ANALYSIS **9**

Analysis of financial statements -Techniques of financial analysis - Comparative Statement-Common size statement-Trend Analysis-Ratio Analysis.

COST AND MANAGEMENT ACCOUNTING **9**

Management Accounting – Funds Flow Analysis - Cash Flow Analysis - Cost Accounting- Functional classification of cost - Preparation of Cost Sheet

MARGINAL COSTING AND BUDGETARY CONTROL **9**

Marginal costing - Break Even Analysis- Applications of marginal costing- Meaning of budget and budgetary control. Preparation of budget -Cash budget- flexible budget and other budgets.

FINANCIAL MANAGEMENT **9**

Financial Management - Objectives and functions - Concept of Time value of money- Techniques in computation of time value of money - Capital Budgeting Decision- Methods of appraisal capital budgeting.

Theory Hours : 3 **Tutorial Hours : 0** **Practical Hours : 0** **Total Hours: 45**

COURSE OUTCOME

CO1. Basic principles of financial accounting, enabling them to record transactions and prepare essential financial statements.

CO2. Acquire skills to interpret and analyze financial statements, evaluating the financial health and performance of an organization.

CO3. Students will understand the analysis of fund flow and cash flow and application of cost accounting technique to ascertain the cost of products and services

CO4.Students will understand the application of marginal costing techniques, preparation and presentation of budgets in business

CO5. Students will understand concept of financial management, time value of money and investment decision on projects.

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REFERENCES

1.R.S.N. Pillai and V.Bagavathi, Financial Accounting, S.Chand publishing, New Delhi 2019.
2.R.S.N. Pillai and V.Bagavathi, Cost Accounting, S.Chand publishing, New Delhi 2019
3. M Y Khan and P K Jain, Financial Management– Text, Problems and Cases, Tata McGraw Hill, New Delhi 2019.
4. John J.Hampton, —Financial Decision Making –Concepts, Problems and Cases‖ Prentice Hall of India (P) Ltd., New Delhi, 2019.

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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21CA3303	SOFT COMPUTING TECHNIQUES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

1. Gain knowledge on fundamental concepts of fuzzy logic.
2. Overview of neural networks, covering neurons, artificial neurons, activation functions, neural network architecture.
3. Explore back propagation networks, including the architecture of perceptron models, single-layer and multilayer artificial neural networks.
4. Gain knowledge on Competitive neural networks
5. Cover the basic concepts, working principles, procedures, representations, initialization, selection, genetic operators (mutation, crossover), and applications of genetic algorithms.

Pre Requisite **NIL**

FUZZY COMPUTING **9**

Basic Concepts of Fuzzy Logic, Fuzzy Sets and Crisp Sets, Fuzzy Set Theory and Operations, Properties of Fuzzy Sets, Fuzzy and Crisp Relations, Fuzzy to Crisp Conversion Membership Functions, Interference in Fuzzy Logic, Fuzzy If – Then Rules, Fuzzy Implications and Fuzzy Algorithms, Fuzzification and Defuzzification, Fuzzy Controller, Industrial Applications.

FUNDAMENTALS OF NEURAL NETWORKS **9**

Neuron, Nerve Structure and Synapse, Artificial Neuron and its Model, Activation Functions, Neural Network Architecture: Single Layer and Multilayer Feed Forward Networks, Recurrent Networks. Various Learning techniques, Perception and convergence Rule. Auto-Associative and Hetero-Associative Memory.

BACKPROPAGATION NETWORKS **9**

Back Propagation Networks) Architecture: Perceptron Model, Solution, Single Layer Artificial Neural Network, Multilayer Perceptron Model; Back Propagation Learning Methods, Effect of Learning Rule Co – Efficient; Back Propagation Algorithm, Factors Affecting Back Propagation Training, Applications

COMPETITIVE NEURAL NETWORKS **9**

Kohenen's Self Organizing Map – SOM Architecture, learning procedure – Application; Learning Vector Quantization – learning by LVQ; Adaptive Resonance Theory – Learning procedure –Applications.

GENETIC ALGORITHM **9**

Basic Concepts, Working Principle, Procedures of GA, Flow Chart of GA, Genetic Representations, (Encoding) Initialization and Selection, Genetic Operators, Mutation, Generational Cycle, Applications

Theory Hours : 3 **Tutorial Hours : 0** **Practical Hours : 0** **Total Hours: 45**

COURSE OUTCOME

CO1. Gain a solid understanding of fuzzy logic principles and their practical applications, preparing them for real-world problem-solving using fuzzy computing.
CO2. Acquire a foundational understanding of neural networks, enabling them to comprehend their structure, functioning, and learning mechanisms.
CO3. Master the principles of back propagation networks, gaining proficiency in designing and implementing neural networks with back propagation learning.

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CO4. Understand the principles of competitive neural networks and their applications, allowing them to design and apply these networks to solve specific problems.
CO5. Equipped with the knowledge to apply genetic algorithms for optimization and problem-solving, fostering a deep understanding of evolutionary computation principles on projects.

REFERENCES

1. J.S.R. Jang, C.T. Sun and E. Mizutani, "Neuro – Fuzzy and Soft Computing", Pearson Education, 2004.
2. S. Rajasekaran and G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Systems and Evolutionary Algorithms: Synthesis and Applications", PHI Learning, 2nd Edition, 2017.
3. S. N. Sivanandam, S. N. Deepa, "Principles of Soft Computing", Third Edition, Wiley, 2018.
4. Simon Haykin, "Neural Networks and Learning Machines", Pearson, 3rd Edition, 2009.
5. Timothy Ross, "Fuzzy Logic with Engineering Applications", Wiley Publications, 4th Edition 2016.

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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21CA3305	E-COMMERCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

1. Understand the fundamental concepts of Information Technology, its relationship with business, and the impact of E-Commerce on business transformation.
2. Explore the essential building blocks of E-Commerce, including Electronic Data Interchange, barcoding, RFID, and Business Process Reengineering.
3. Examine legal issues, risks, and technologies associated with cyber security in the context of E-Commerce.
4. Explore the legal framework governing E-Commerce, with a focus on the IT Act 2000 and its provisions.
6. 5. Analyze real-world case studies to understand the application of E-Commerce principles and strategies.

Pre Requisite **NIL**

INTRODUCTION

Information technology and Business-E-Commerce-EDI-E-Commerce types-E-Commerce and World Wide Web-Internet Connectivity-E-Commerce – case studies leading the Transformation-E-Governance case studies leading the Transformation – - Internet communication protocols-Internet services and Resources-Internet Mail-Internet search-issues of concern-Browsers-HTML Java-Internet 2 — 9

BULIDING BLOCKS FOR E-COMMERCE

Electronic Data Interchange -. costs and benefits – Components of EDI systems- EDI Implementation issues-Identification and tracking tools-The EAN, EANCOM- riticle numbering-bar coding – EAN location numbering –RFID-Business Process Reengineering-Approaches to BBR-Strategic alignment model-BBR Methodology-Management of change- change management – the change management in the government – the implementation plan — 9

CYBER SECURITY

Legal issues – Risks – paper documents vs electronic document-technology for authenticating electronic document-Laws for E-Commerce - Cyber-attack-hacking-firewalls-Intrusion Detection System-Secure Socket layer-authentication and assurance of data integrity-cryptography based solutions-digital signature-the protocols for secured messaging-guidelines for cryptography policy-Virtual Private Network. Cybercrimes and Information technology act 2000- cyber forensics — 9

IT ACT 2000

Trust in the Electronic environment-electronic authentication-paper-vs electronic world-The IT act 2000-cybercrimes under the IT act.
Public key infra-structure- PKI and Certifying Authorities – Electronic payment systems and internet banking-payment gateway-Internet banking-PayPal- Secure Electronic Transaction protocol-electronic cash- electronic cheque- elements of electronic payments — 9

CASE STUDIES

E-Commerce Case Studies- E-Commerce in India- Indiatimes.com-Rediff.com-Bazee.com-Steel Authority of India-Amul- the taste of India — 9

Theory Hours : 3 **Tutorial Hours : 0** **Practical Hours : 0** **Total Hours: 45**

COURSE OUTCOME

CO1. Gain knowledge about various types of E-Commerce, Internet communication protocols, and key technologies shaping the digital landscape.
CO2. Explore the critical building blocks of E-Commerce and different types of prevailing business models employed by leading industrial leaders.

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CO3. Develop an understanding of key cyber security measures such as firewalls, Intrusion Detection Systems, encryption, and secure communication protocols.
CO4. Gain knowledge about trust in the electronic environment, electronic authentication, and the role of Public Key Infrastructure (PKI) in securing digital transactions.
CO5. Develop insights into successful E-Commerce implementations through case studies of prominent companies, including their challenges and achievements.

REFERENCES

1. Greenstein, "Electronic Commerce", Tata Mc-Graw Hill Pvt., Ltd., 2000.
2. Kamalesh K. Balaji,Debjani Nag, "E-Commerce", Second Edition, McGraw Hill Education, 2015.
3. Sanjay Mohapatra," E-Commerce Strategy: Text and Cases", Springer, 2020.
4. C.S.R. Prabhu, E-Governance: Concepts and Case Studies, Springer, 2018.
5. Jeffrey F. Rayport and Bernard J. Jaworski, "Introduction to ECommerce", 2nd Edition, Tata Mc-Graw Hill Pvt., Ltd., 2003.

COURSE ASSESSMENT METHODS			
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21CA3306	MIXED REALITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

1. Gain an understanding of Virtual Reality (VR) and Augmented Reality (AR), including their definitions, key components, and benefits.
2. Explore the computing architectures of VR and AR.
3. Learn the principles of modeling in Mixed Reality (MR), covering geometric modeling, kinematics modeling, physical modeling, and behavior modeling.
4. Develop proficiency in programming for VR and MR, exploring toolkits, scene graphs, and human factors in VR.
5. Explore various applications of MR in different fields.

Pre Requisite **NIL**

INTRODUCTION

Introduction to Virtual Reality (VR)–Definition– Three I's of VR–VRVs3DComputer Graphics - Benefits - Components of VR– Introduction to AR – System Structure– Key Technology in AR –3DVision–Approaches-AlternativeInterfaceParadigms–SpatialAR–InputDevices–3DPositionTrackers – Performance Parameters – Types of Trackers – Navigation and Manipulation Interfaces –Gesture Interfaces – Types of Gesture Input Devices – Output Devices – Graphics Display –Human Visual System – Personal Graphics Displays – Large Volume Displays – Sound Displays –Human Auditory System. 9

AR & VR COMPUTING ARCHITECTURE

Computing Architectures of VR –Workstation Based Architectures – SGI Infinite Reality Architecture – Distributed VR Architectures – Multi-pipeline Synchronization–AR Architecture - Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems. 9

MRMODELING

Modeling – Geometric Modeling – Virtual Object Shape – Object Visual Appearance – KinematicsModeling–TransformationMatrices–ObjectPosition–TransformationInvariants–Object Hierarchies–ViewingThe3DWorld–PhysicalModeling–CollisionDetection–Surface Deformation–ForceComputation–ForceSmoothingAndMapping–BehaviorModeling–ModelManagement. 9

MR PROGRAMMING

VR Programming – Toolkits and Scene Graphs – World Toolkit – Java 3D – Comparison of World Tool kit and Java3D – GHOST – People Shop – Human Factors in VR – Methodology and Terminology – VR Health and Safety Issues – VR and Society –Mixed Reality Coding –Trajectories through Mixed Reality Performance – Mobile Interface Design – Quantitative Evaluation – Qualitative Evaluation. 9

APPLICATIONS

Medical Applications of MR – Education, Arts and Entertainment – Military MR Applications – Emerging Applications of MR –MR Applications in Manufacturing – Applications of MR in Robotics – Information Visualization – Wearable Computing – Games 9

Theory Hours : 3 **Tutorial Hours : 0** **Practical Hours : 0** **Total Hours: 45**

COURSE OUTCOME

CO1. Explain the fundamentals of AR and VR systems
CO2. Knowledge of different computing architectures used in VR and AR,
CO3. Acquire skills in creating virtual object shapes, understanding object hierarchies, and applying modeling techniques for realistic interactions in MR environments.

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CO4. Able to use VR programming toolkits, design interfaces for VR applications, and address health and safety issues related to VR.
CO5. Gain insights into real-world applications of MR and understand its impact on diverse fields, paving the way for creative and practical use in their future endeavors.

REFERENCES

R1. Grigore C. Burdea, Philip Coiffet, "Virtual Reality Technology", Second Edition, Wiley India, 2017.
R2. Benford, S., GiannachiG., "Performing Mixed Reality", MIT Press, 2011.
R3. Charles Palmer,John Williamson, "Virtual Reality Blueprints: Create Compelling VR Experiences for Mobile", Packt Publisher, 2018.
R4. Jason Jerald, "The VR Book: Human-Centered Design for Virtual Reality" Association for Computing Machinery and Morgan, Claypool Publishers, 2015
R5. William R. Sherman, Alan B.Craig: Understanding Virtual Reality – Interface, Application,Design", Morgan Kaufmann, 2003
R6. .Kelly S.Hale, Kay M.Stanney Handbook of Virtual Environments: Design, Implementation, and Applications, Second Edition, CRC press, 2014.

COURSE ASSESSMENT METHODS			
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21CA3307	ORGANIZATIONAL BEHAVIOR	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

1. Gain Foundational understanding of organizational behavior models and key elements of organizational structure.
2. To gain insight about various aspects related to individuals' behavior in an organization.
3. To comprehend the foundations of Group behavior in organization
4. To expose students to various leadership styles and the influence of Power and politics in organization.
5. To enable students familiar with organizational culture and the dynamics of organizational behavior.

Pre Requisite **NIL**

INTRODUCTION

Manager's functions, roles and skills. Organizational behavior: Definition – contributing disciplines - challenges and opportunities – Developing an OB Model - Organizational behavior models. Organization structure: key elements – common organizational designs - determinants. 9

INDIVIDUAL BEHAVIOR

Personality: Definition - determinants – MBTI, Big Five, 16 PF and other personality traits. Values – terminal Vs instrumental values. Emotions - Emotional Labour – Emotional Intelligence. Attitude – components – major job attitudes. Job satisfaction: causes – consequences. Perception – factors influencing perception – attribution theory. Motivation – early theories – contemporary theories. 9

GROUP BEHAVIOR

Groups: Meaning – stages of group development – properties – group decision making.
Teams: Types – creating effective teams. Communication: Functions – process – direction of communication – interpersonal communication – organizational communication – barriers. 9

LEADERSHIP AND POWER

Leadership: Meaning – trait theories, behavioural theories, contingency theories. Power – bases of power – power tactics. Politics – causes and consequences. Impression Management. 9

ORGANIZATIONAL CULTURE AND DYNAMICS

Organizational culture: Definition – functions – creating and sustaining culture. Organizational change: forces – planned change – resistance to change – approaches to manage change. Stress: Meaning – potential sources – consequences of stress – Managing stress. 9

Theory Hours : 3 **Tutorial Hours : 0** **Practical Hours : 0** **Total Hours: 45**

COURSE OUTCOME

CO1. Able to describe the functions and roles of managers, identify key elements of organizational behavior models, and analyze organizational structures.
CO2. Understand aspects like personality, learning, emotions, attitudes, perceptions, motivation etc which affects individual's behaviour in an organization.
CO3. Able to analyze group dynamics, identify factors influencing perception and communication, and understand the role of groups and teams in organizations.
CO4. Develop insights into leadership styles, understand power dynamics, and analyze the influence of politics in organizational settings.
CO5. Able to analyze organizational culture, understand the dynamics of change, and propose strategies for managing stress in organizational contexts

REFERENCES

R1 - Fred Luthans, "Organizational Behavior", McGraw Hill, 12th Edition, 2013.
R2 - Steven McShane and Mary Von Glinow , "Organizational Behavior", 4th Edition, 2019.
R3- Schermerhorn, Hunt and Osborn, "Organizational behavior", John Wiley, 9th Edition, 2011.

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20CA3309	SEMANTIC WEB SERVICES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

1. To learn the fundamentals of semantic web and to conceptualize and depict ontology for semantic web.
2. Gain proficiency in languages essential for the semantic web.
3. Understand the processes and methods involved in ontology learning for the semantic web.
4. Comprehend the need for ontology management, the development process, ontology mapping, and the evolution of ontologies.
5. Explore various applications of semantic web technologies, including web services, semantic web services, security issues, and applications in specific domains.

Pre Requisite **NIL**

THE QUEST FOR SEMANTICS

Building Models – Calculating with Knowledge – Exchanging Information – Semantic Web Technologies – Layers – Architecture – Components – Types – Ontological Commitments – Ontological Categories – Philosophical Background – Sample Knowledge Representation Ontologies – Top Level Ontologies – Linguistic Ontologies – Domain Ontologies – Semantic Web – Need – Foundation. 9

LANGUAGES FOR SEMANTIC WEB AND ONTOLOGIES

Web Documents in XML – RDF – Schema – Web Resource Description using RDF – RDF Properties – Topic Maps and RDF – Overview – Syntax Structure – Semantics – Pragmatics –Traditional Ontology Languages – LOOM – OKBC – OCML – FLogic Ontology Markup Languages – SHOE – OIL – DAML + OIL – OWL 9

ONTOLOGY LEARNING FOR SEMANTIC WEB

Taxonomy for Ontology Learning – Layered Approach – Phases of Ontology Learning –Importing and Processing Ontologies and Documents – Ontology Learning Algorithms –Methods for Evaluating Ontologies 9

ONTOLOGY MANAGEMENT AND TOOLS

Overview – Need for Management – Development Process – Target Ontology – Ontology Mapping – Skills Management System – Ontological Class – Constraints – Issues, Evolution – Development Of Tools And Tool Suites – Ontology Merge Tools – Ontology Based Annotation Tools. 9

APPLICATIONS

Web Services – Semantic Web Services – Case Study for Specific Domain – Security Issues – Web Data Exchange and Syndication - Semantic Wikis – Semantic Portals – Semantic Metadata in Data Formats – Semantic Web in Life Sciences – Ontologies for Standardizations – Rule Interchange Format 9

Theory Hours : 3 **Tutorial Hours : 0** **Practical Hours : 0** **Total Hours: 45**

COURSE OUTCOME

CO1. Equipped with a solid understanding of semantic web technologies, ontological commitments, and different types of ontologies.

CO2. Develop skills in working with semantic web languages and ontologies, facilitating effective knowledge representation.

CO3. Capable of employing ontology learning algorithms, importing and processing ontologies, and evaluating the quality of ontologies.

CO4. Proficient in managing ontologies, dealing with issues in development, and utilizing ontology management tools effectively.

CO5. Gain insights into practical applications of semantic web technologies across different domains, including web services, life sciences, and data formats.

REFERENCES

1. Pascal Hitzler, Markus Krotzsch, Sebastian Rudolph, "Foundations of Semantic Web Technologies", Chapman & Hall/CRC, 2009.

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2. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernandez-Lopez "Ontological Engineering: with Examples from the Areas of Knowledge Management, Ecommerce and the Semantic Web", Springer, 2004.
3. Grigoris Antoniou, Frank van Harmelen, "A Semantic Web Primer (Cooperative Information Systems)", The MIT Press, 2004.
4. Alexander Maedche, "Ontology Learning for the Semantic Web", Springer, 2002.
5. John Davies, Dieter Fensel, Frank Van Harmelen, "Towards the Semantic Web: Ontology –Driven Knowledge Management", John Wiley, 2003.
6. John Davies, Rudi Studer, Paul Warren, "Semantic Web Technologies: Trends and Research in Ontology-based Systems", Wiley, 2006.

COURSE ASSESSMENT METHODS			
DIRECT	1. Continuous Assessment I and II 2. Assignment / Activity 3. End Semester Examination	**INDIRECT**	1. Course Exit Survey

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21CA3310	FUNDAMENTALS OF CLOUD COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

1. To learn recent cloud computing paradigms.
2. To introduce the concept of Virtualization and the secured cloud environment.
3. Grasp the fundamental concepts and components of cloud architecture.
4. To understand the concepts and programming models in parallel and distributed computing environment.
5. Thorough understanding of cloud security principles and practices

Pre Requisite Nil

UNIT I - INTRODUCTION

Cloud models-Evolution of Cloud Computing –System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture – On-demand Provisioning – Elasticity in Cloud – deployment models – service models-cloud service providers **9**

UNIT II - VIRTUALIZATION

Basics of Virtualization - Types of Virtualizations - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms – resource sharing and resource pooling - Desktop Virtualization – Server Virtualization. **9**

UNIT III - CLOUD INFRASTRUCTURE

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources. **9**

UNIT IV - PROGRAMMING MODEL

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map M.C.A. Page 64 Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support. **9**

UNIT V - SECURITY IN THE CLOUD

Security Overview – Cloud Security Challenges – Access control mechanisms – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Virtual Machine Security. **9**

Theory Hours : 45 **Tutorial Hours : 0** **Practical Hours : 0** **Total Hours: 45 Hours**

CO1: Analyze various cloud programming models and apply them to solve problems on the cloud.
CO2: Build cloud architecture.
CO3: Explain the core concepts of the cloud computing paradigm.
CO4: Get clear knowledge of various cloud models and their services, characteristics, advantages and Challenges.
CO5: Interpret the security issues in cloud

REFERENCES

1. 1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, 2012, 1 st Edition, Morgan Kaufmann Publishers.
2. Katarina Stanoevska-Slabeva, Thomas Wozniak, SantiRistol, Grid and Cloud Computing – A Business Perspective on Technology and Applications, 2010, Springer

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3. John W.Rittinghouse and James F.Ransome, Cloud Computing: Implementation, Management, and Security", 2010, CRC Press.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach, 2009, TMH.
5. George Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud O'Reilly, 2009.

PROGRMME OUTCOMES (PO's) 3/2/1/- → Indicate the Strength of Correlation 3 – Strong; 2 – Medium; 1 – Weak												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	2	1			-	-	-	-	**1**	-
CO2	2	1	2	3	2	1	-	-	-	-	**1**	-
CO3	2	1	2	3	2	1	-	-	-	-	**1**	-
CO4	2	3	2	1			-	-	-	-	**1**	-
CO5	2	1	2	3	2	1	-	-	-	-	**1**	-

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DEPARTMENT OF COMPUTER APPLICATIONS

(I) Syllabus Revision for the Regulations 2024

S.No	Courses in which revision has been done	Action taken	Percentage Syllabus Revised
1.	Database Management Systems	Modified	45%
2	Database Management Systems Lab	Modified	17%

(II) Syllabus Revision for the Regulations 2020

S.No	Courses in which revision has been done	Action taken	Percentage Syllabus Revised
1.	Cryptography Network Security	Modified	45%

Overall Percentage of revision made in the BoS: 12.5 %

(III) New Course Introduced

S. No	Regulation	Course Code with Name	Credits
1	R2024	Probability And Statistics for Data Analytics	4
2	R2024	Data Communication and Networking	3
3	R2024	Web Technology	4
4	R2024	Research Methodology	3
5	R2020	Deep Learning and Data Visualization	4
6	R2020	Ethics In Computing	3
7	R2020	Artificial Intelligence	3
8	R2020	Deep Learning and Visualization Lab	1.5

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