MCA

Semester-I

L-3 T-1 P-0 C-4

25MCA110T: Data Communication and Network

Course Objectives

- To understand the basic concepts of data communication, layered model, protocols.
- Analyze the services and features of various protocol layers in data networks.
- To learn about MAC Layer, ALOHA.
- To understand Network and Transport Layer Protocols.
- To understand Presentation and Application Layer Protocols.

Course Outcomes (COs)

1. Understand the key components of the layered network architecture.
2. Apply the ISO-OSI model and TCP/IP model, identifying their layers and functions.
3. Analyze of HDLC, ISDN, and ATM in designing and analyzing data link protocols.
4. Evaluate the performance of LAN protocols such as IEEE 802.3, 802.4, and 802.5.
5. Create the security aspects of presentation and application layer protocols.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1		3	-	-	2	-	1	-	-	-	-	-
CO2	1		3	2	-	1	-	1	-	-	-	-
CO3	-	2	-	3	-	-	2	-	1		-	-
CO4	1	-		2	3	-	-	1	-	-	-	-
CO5	-	1	2	-		3	1	-	2	-	-	-

High-3 Medium-2 Low-1

Unit-I: Network Architecture 12 Hours

Layered Network Architecture, ISO-OSI Model, TCP/IP Model, Data Communication Techniques; Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM); Multiplexing Techniques; Frequency Division, Time Division, Statistical Time Division Multiplexing. **Transmission Media**: Physical Layer, Wires, Cables, Radio Links, Satellite Link, Fiber Optic.; Error Detection and Correction: Single and Burst Error, parity Check Codes, Cyclic Redundancy Code & Hamming Code.

Unit-II: Protocol Concept 12 Hours

Data Link Layer Protocols Stop and Wait Protocols: Noise free and Noisy channels, performance and efficiency, Sliding Window Protocols: Go Back and Selective Repeat ARQS, performance and efficiency, verification of protocol. HDLC and ATM: HDLC data link protocol, ISDN, Channel Structure, Asynchronous Transfer Mode (ATM), ATM Cells, Header and Cell Format. Layers in ATM Class 1,2,3,4 traffic

Unit-III: Media Access Control 12 Hours

Medium Access Control Sublayer Concept of Random Access, Pure ALOHA throughput characteristics of ALOHA Throughputs for finite and infinite populations S-ALOHA., LAN: IEEE 802.3, 802.4 and 802.5 Protocols performance of Ethernet. Token Ring Protocol, FDDI Protocol, Distributed Queue Dual Bus (DQDB) Protocol.

Unit-IV: Network Layer Protocol **12 Hours**

Network Layer Protocols: General Principles, Virtual circuits and datagrams, Windows flow control, Packet Discarding, Traffic Shaping, Choke RSVP, ATM, Internetworking using Bridge, Routers and Gateways, Routing Algorithms: Optimality principle, shortest path routing-Dijkstra, Flooding and broadcasting, distance vector routing, link state routing, flow-based routing, Multicasting routing flow and congestion control. Internet Architecture and Addressing

Unit-V: Transport Layer **12 Hours**

Transport Layer: Design issues, Quality of Services, Primitives Connection Management: Addressing, Connection Establishment and Releases. Flow control and Buffering, Crash recovery, Element of TCP/IP protocol: User Datagram Protocol, (UDP/TCP) Layering. Presentation And Application Layer Protocols Presentation concepts SNMP Abstract Syntax notation, I (ASN-I), Cryptography: Substitutions and Transposition, Ciphers, Data Encryption Standard (DES), DES Chaining, Breaking DES, Public Key Cryptography, Authentication Protocols.

Total: 60 Hours

Textbooks:

1. A. S. Tanenbaum "Computer Network: Second Ed. Prentice Hall, India (tan).
2. B. A. Frouzan, Data Communication, Tata Mc Graw Hill.
3. D. Berekas an R. Gallager, "Data Networks:, second Ed. Prentice Hall, India.

Reference Books:

1. D. E. Coner, "Intertworking with TCP/IP", Vol-I.Prentice Hall India.
2. G. E. Keiser, "Local Area Network", McGraw Hill, International Ed.
3. W. Stalling, "Data & Computer Communications", Maxwell Macmillan Internation Ed.

List of E-Learning Resources:

1. https://www.nptel.com
2. https://www.coursera.com
3. https://www.javatpoint.com
4. https://www.simplilearn.com

Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

MCA

Semester-I

L-3 T-1 P-0 C-4

25MCA230T: Computer Architecture and Organization

Course Objectives

- To understand the the principles underlying computer architecture and organization.
- Learn the throughput, and efficiency, and qualitative metrics of system.
- To learn about design and implement basic components of computer systems.
- To understand the techniques for optimizing the performance of computer systems.
- To learn microprocessors, embedded systems, and parallel computing platforms.

Course Outcomes (COs)

1. Understand fundamental concepts in computer architecture.
2. Apply the performance of different processor architectures using metrics.
3. Analyze arithmetic logic units (ALUs), registers, control units, and memory systems.
4. Evaluate the performance optimization techniques for improving the performance.
5. Create the impact of new memory technologies (e.g., non-volatile memory) on system design.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1		3	-	-	2	-	1	-	-	-	-	-
CO2	1	2	3		2	1	-		1	-	-	-
CO3	-	-	-	3	-	-	2	-	-	-	-	-
CO4	1	-	2		3	-	-	1	-	-	-	-
CO5	-	2	-	1		3	1	-	2	-	-	-

High-3 Medium-2 Low-1

Unit-I: Number Systems and Arithmetic 12 Hours

Different number systems and their interconversions. Binary arithmetic: Binary addition, subtraction, multiplication and division. Hexadecimal arithmetic: Addition, subtraction, multiplication and division. Binary subtraction using 1's complement, 2's complement method, overflow, underflow, codes, fixed point representation, and floating point representation.

Unit-II: Logic Gates 12 Hours

Boolean algebra and logic gates postulates of Boolean algebra theorems of Boolean algebra: Complementation, commutative, AND, OR, Associative, Distributive, Absorption laws, demurrage's theorems, reducing Boolean expressions. Logic gates: AND, OR, NOT, Ex-OR, EX-NOR NAND and NOR as Universal gates.

Unit-III: Circuit Techniques 12 Hours

Minimization techniques Introduction to SOP and POS minterms, midterms, K-map, K-map for 2, 3, 4, 5 variables, don't care condition. Combinational and Arithmetic logic Circuits: Half Adder and full Adder Binary Parallel Adder Half Subtractor, full subtractor, Magnitude Comparator, Multiplexer and Demultiplexer.

Unit-IV: Flip Flops Concepts **12 Hours**

Introduction: RS FF Clocked RS FF, forbidden state/invalid state, JK FF, TFF, Race around condition Master Slave FF, level triggering Vs edge triggering, DFF Triggering preset and clear.

Unit-V: Introduction of Counters **12 Hours**

Asynchronous: Ripple Counter Modules counter, MOD-12 counter, Synchronous counter: Synchronous serial and Parallel counter, decade counter, Ring counter Johnson counter, Introduction to registers: SISO, SIPO, PISO, PIPO, Shift registers, buffer register, control buffer register, shift left, shift right, bidirectional shift register.

Total: 60 Hours

Reference Books:

1. M. Morris Mano, "Computer System Architecture", PHI, 3rd edition, 1993
2. Govindarajalu "Computer Architecture & Organisation".
3. M.Mano "Digital Logic & Computer Design"
4. Malvino, "Digital Computer Electronics".

List of E-Learning Resources:

1. https://www.nptel.com
2. https://www.coursera.com
3. https://www.javatpoint.com
4. https://www.simplilearn.com

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MCA

Semester-I

L-2 T-1 P-0 C-3

25MCA260T: Object Oriented Concepts using C++

Course Objectives

- To learn the basics of Object-Oriented Programming concepts.
- To define class and objects and class members.
- Understanding the principles of data abstraction, inheritance and polymorphism.
- To understand and apply streams and File concepts.
- Evaluate the I/O and Introduces exception handling.

Course Outcomes (COs)

1. Understand Object Oriented Programming concepts using the C++ language.
2. Apply the principles of data abstraction, inheritance and polymorphism.
3. Analyze the principles of virtual functions and polymorphism.
4. Evaluate the handling of formatted I/O and unformatted.
5. Create the I/O and exception handling.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1		3	2	-	-	-	-	1	-	-	-	-
CO2	2		3	2	-	1	-	2	1	-	-	-
CO3	1	2		3	-	3	-	-		-	-	-
CO4	2		1	-	3	-	1	-	2	-	-	-
CO5	-	1	-	2		3	-	1	-	-	-	-

High-3 Medium-2 Low-1

Unit-I: Introduction 09 Hours

History of C++, C++ Characteristics, Difference between C and C++, Basic Structure of a C++ program, Compiling and Executing C++ Program. Selection control statements in C++. Data types, Expression and control statements Iteration statements in C++, Introduction to Arrays, Multidimensional Arrays, Strings and String related Library Functions.

Unit-II: Classes and Objects 09 Hours

Introduction, class specification, class objects, accessing class members, defining member functions, accessing member functions within a class, outside member functions as inline, private member functions. **Memory allocation for objects:** array of objects, function prototype, call by reference, return by reference, objects as function arguments, inline function, friend function, constant parameter and member function. **Object Initialization:** Introduction - constructors, default constructor, parameterized constructors, multiple constructors in a class, dynamic initialization through constructors, copy constructor, destructor. **Dynamic Objects:** Introduction, pointers to objects, array of pointers to objects, this pointer.

Unit-III: Inheritance & Polymorphism 09 Hours

Introduction, derived class declaration, forms of inheritance, inheritance and member accessibility, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance. **Polymorphism:** Introduction, Function overloading, Operator overloading introduction, unary operator overloading, binary operator overloading, assignment operator

overloading, overloading with friend functions. **Data conversion:** conversion between basic data types, conversion between objects and basic types, conversion between objects of different classes. Virtual function: Introduction, need for virtual functions, pure virtual functions, abstract classes.

Unit-IV: Generic Programming with Templates **09 Hours**

Introduction - class templates – class template with multiple arguments, **Function template:** Function template with multiple arguments, Inheritance of class template. **Streams with Files:** Introduction, hierarchy of file stream classes, opening and closing of files, file pointers and their manipulators, sequential access to a file, file input/output with stream class, random access to a file.

Unit-V: Exception Handling **09 Hours**

Introduction– Basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism. Exceptions in constructors and destructors, **Other Exception Handling methods:** Handling uncaught exceptions, exceptions in operator overloaded functions, exceptions in inheritance tree, exceptions in class templates, memory allocation failure exception.

Total: 45 Hours

Textbooks:

1. "C++ Primer", Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo, Addison-Wesley
2. "Accelerated C++: Practical Programming by Example", Andrew Koenig and Barbara E. Moo, Publication: Addison-Wesley",
3. “C++ How to Program", Paul J. Deitel and Harvey Deitel, Publication: Pearson

Reference Books:

1. C++ Primerby Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo, Pearson Education Asia
2. The C++ Programming Language by Bjarne Stroustrup, Addison–Wesley
3. Let Us C++ by Yashavant Kanitkar, BPB Publications
4. Beginning C++17: From Novice to Professional by Ivor Horton, Apress Publication

List of e-Learning Resources:

1. https://nptel.ac.in/
2. https://www.coursera.org/

Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

MCA

Semester-I

L-2 T-1 P-0 C-3

25MCA270T: Advanced Database Management Systems

Course Objectives

- To learn about Query Processing and Optimization.
- To understand Transaction Processing and Concurrency control.
- To learn Database backup and Recovery techniques.
- To understand Implementation Security in Databases.
- To learn and apply PL/SQL concepts.

Course Outcomes (COs)

1. Understand the fundamental concepts of database management systems.
2. Apply SQL and other queries to retrieve, manipulate, and manage data efficiently.
3. Analyze security issues and implement measures to protect sensitive data.
4. Evaluate database-driven web applications, integrating backend database functionality with a user interface.
5. Create the ethical implications and legal considerations associated with data handling.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	3	-	2	-	1	-	2	-	-	-	-
CO2	1	2	3	-	2	1	1	-	-	-	-	-
CO3	-	1	-	3	-	-	2	-	1	-	-	-
CO4	2	-	1	-	3	-	-	-	-	-	-	-
CO5	1	-	2	1	-	3	-	2	-	-	-	-

High-3 Medium-2 Low-1

Unit-I: Introduction to Database 9 Hours

Introduction of Database, Types of Databases, what is RDBMS, DBMS vs RDBMS, DBMS Architecture, three schema Architecture, Data model schema, Data Independence, DBMS Language, Data modeling: ER model concept, Notation for ER diagram, Mapping constraints, DBMS Keys, DBMS Generalization, DBMS Specialization, DBMS Aggregation, Convert ER into table, Relationship.

Unit-II: Relational data Model 9 Hours

Relational Model concept, Relational Algebra, Join Operation, Integrity Constraints, Normalization: Functional Dependency, Inference Rule, DBMS Normalization, DBMS 1NF, DBMS 2NF, DBMS 3NF, DBMS BCNF, DBMS 4NF, DBMS 5NF, Relational Decomposition, Multivalued Dependency, Join Dependency, Inclusion Dependence.

Unit-III: Transaction Processing 9 Hours

Transaction, Transaction Property, States of Transaction, Serializability, Conflict schedule, Recoverability of Schedule, Failure Classification, Deadlock. **Concurrency Control**: Concurrency Control, **Protocol:** Protocol, types of protocol, Granularity, **Organization:** File

organization, Types of file organizations, Indexing and Hashing, Types of Indexing and Hashing.

Unit-IV: SQL Introduction **9 Hours**

SQL Introduction, Characteristics of SQL, Advantage of SQL, SQl Data Type, SQL Command, SQL Operator, SQL Table, SQL SELECT Statement, SQL INSERT Statement, SQL Update Statement, SQL JOIN, SQL Set SQL DELETE Statement, SQL View, SQL Index, SQL Sub Queries, SQL Clauses, SQL Aggregate Function, Operation.

Database backup and Recovery: Elements of backup and recovery, user managed backups, cold, hot and control file backups, **User managed complete recovery:** Non archive log, archive log, control file recovery, **User managed incomplete recovery:** Cancel based, time based, change based recovery.

Unit-V: PL/SQL (OA) **9 Hours**

Fundamentals: Introduction, Benefit and creating PL/SQL block, Defining Variables and Data types, Using SQL in PL/SQL , Program Structures to Control Execution Flow , how we Using Cursors and Parameters, Exception Handling , Using and Managing Procedures, Functions, Packages and Triggers.

Total: 45 Hours

Reference Books:

1. Database Management Systems, Ramakrishnan, Gehrke, Third edition, McGraw Hill
2. SQL, PL/SQL – The programming Language Oracle-by Ivan Bayross.
3. Database System Concept- Silbers catz, Korth, Sudarshan , Fifth Edition, McGraw Hill.
4. Fundamentals of Database Systems, Elmsasri Navathe, Third edition, Addison Wesley.
5. Database Systems: Design , Implementation and Management , seventh edition , Peter
   Rob, Carlos Coronel, Thomson Course technology.

List of e-Learning Resources:

1. https://nptel.ac.in/
2. https://www.coursera.org/

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MCA

Semester-I

L-2 T-1 P-0 C-3

25MCA280T: Web Technologies

Course Objectives

- To understand basic concepts of HTML and CSS.
- To learn the basics of PHP.
- To learn modular programming and oops concepts.
- To work with forms.
- To learn about connecting applications to databases.

Course Outcomes (COs)

1. Understand HTML tags and basic CSS and PHP syntax.
2. Apply the structure of HTML documents and PHP data types.
3. Analyze HTML documents and use PHP to manipulate variables and loops.
4. Evaluate PHP functions and error handling concepts.
5. Create Web Content using MVC, and databases in web development.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	3	2	-	1	-	-	2	-	-	-	-
CO2	1	2	3	-	2	1	1	-	-	-	-	-
CO3	-	1	-	3	-	-	2	-	1	-	-	-
CO4	2	-	1	-	3	-	-	-	-	-	2	1
CO5	1	-	2	1	-	3	-	2	-	-	1	2

High-3 Medium-2 Low-1

Unit-I: Basic structure of HTML 9 Hours

HTML Documents, Basic structure of an HTML document , Creating an HTML document, Markup Tags, Heading-Paragraphs, Line Breaks, HTML elements, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Adding Images, Working with Forms and controls, Cascading Style Sheets: Features, Core Syntax, Types, Style Sheets and HTML, Style Rules - Cascading and Inheritance, Text Properties, CSS Box Model, Floating and Positioning, CSS Layout with Flexbox and Grid, Responsive Web Design, Transitions, Transforms and Animations.

Unit-II: Introduction to PHP 9 Hours

Introduction to PHP, PHP data types, Variable, Constants, Variable scope, Operators, Variable manipulation, Dynamic variables, Static vs. Dynamic Optimization, If, else if, switch statement, loops: while, do while, for, for each, breaking out of loops: Break, Continue, and exit. **Array:** Indexed arrays, Associative arrays, Multidimensional arrays, Getting the size of an array, looping through an array, looping through an associative array, Sorting arrays, Sorting an associative array.

Unit-III: Function & Exception Handling 9 Hours

Function, creating a function, returning a value from the function, User-defined functions, Dynamic function calls, passing arguments by value, passing arguments by reference.

Advance PHP: Object oriented concepts, define a class, Class attributes, Object: Creating an object, Object properties, Object methods, constructors and destructors, Class constants, Static method, **Exception Handling:** Understanding Exception and error, Try, catch, throw.

Unit-IV: Working with Form **9 Hours**

GET and POST data, Combine HTML and PHP code, create user Forms using database, File Inclusion: Include (), Require (), Importing user input, accessing user input, using hidden fields, Redirecting the user, upload a File, Delete a File. **CodeIgniter:** Download & Install CodeIgniter [Configuration Included] CodeIgniter Application's FOLDER & FILE Structure; CodeIgniter MVC (Model View Controller) Framework with Example; CodeIgniter Form & Form Validation with Example.

Unit-V: Introduction to RDBMS **9 Hours**

Connection with MySQL Database, performing basic database operations (DML) (Insert, Delete, Update, Select), Setting query parameter, Executing query. **Session and Cookies:** Introduction to Session Control, Creating Session, Set Session, Destroying Session**,** what is a Cookie, Creating Cookies, Set Cookies, Destroying Cookies, **CodeIgniter Database:** Create, Update, Delete How to Upload Image & File in CodeIgniter (with Example) How to Send Email using CodeIgniter.

Total: 45 Hours

Reference Books:

1. Learning PHP, MySQL, By O' riley Press
2. Eric Filson , Erick Rosebrock, Setting up LAMP: Getting Linux, Apache, MySQL, and PHP Working Together, SyBex (2004).
3. Matt Doyle, Beginning PHP 5.3, Wiley (2010).

List of e-Learning Resources:

1. https://nptel.ac.in/
2. https://www.coursera.org/

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MCA

Semester-I

L-0 T-0 P-2 C-1

25MCA260P: Object Oriented Concepts using C++

Course Objectives

- To learn the basics of Object-Oriented Programming concepts.
- To define class and objects and class members.
- Understanding the principles of data abstraction, inheritance and polymorphism.
- To understand and apply streams and File concepts.
- Evaluate the I/O and Introduces exception handling.

Course Outcomes

Students will able to

1. Understand Object-Oriented Programming (OOP) concepts using the C++ language.
2. Apply the principles of data abstraction, inheritance, and polymorphism in C++ programming.
3. Analyze the implementation and application of virtual functions and polymorphism in C++.
4. Evaluate different techniques for handling formatted and unformatted I/O in C++.
5. Design and implement programs in C++ that include I/O operations and exception handling.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	3	-	2	-	-	-	1	-	-	-	-
CO2	2		3	2	-	1	-	2	1	-	-	-
CO3	1	2	-	3	-	2	-	-	-	-	-	-
CO4	2		1	-	3	-	1	-	2	-	-	-
CO5	-	1	-	2		3	-	1	-	-	-	-

High-3 Medium-2 Low-1

Unit 1: Basics of C++ Programming

Introduction to C++ Programming, Input and Output Operations, Basic Arithmetic and Assignment Operators.

Unit 2: Control Structures and Functions

Conditional Statements, If-else statements, Switch-case statements. Looping Constructs(For loop, While loop, Do-while loop), User-Defined Functions.

Unit 3: Arrays, Matrices, and Strings

Arrays(Single-dimensional arrays,Multi-dimensional arrays), Strings, Structures.

Unit 4: Object-Oriented Programming (OOP) Concepts
Classes and Objects, Constructors and Destructors, Member Functions and Overloading.

Unit 5: Advanced OOP Concepts
Inheritance (Single and multiple inheritance), Polymorphism and Virtual Functions, Friend Functions and Classes, Exception Handling, Practical Application Projects.

List of Experiments:

1. Write a program to print numbers, alphabets, and special characters on the output screen.
2. Write a program that accepts age in years from the user as input and displays his age in months and days.
3. Write a program that demonstrates the use of arithmetic and assignment operators by getting two numbers from the user.
4. Write a program that calculates the area of a circle, square, rectangle, and triangle using switch-case statements.
5. Write a program that accepts numbers from the user and displays all the factors of that number.
6. Write a program that accepts a number from the keyboard and finds its factorial.
7. Write a program that accepts 9 numbers in the form of a matrix and displays the transpose of that matrix.
8. Write a program to count the number of words in a sentence.
9. Write a program to create a structure of a book which contains book title, author name, publication, and price as its members and displays book records for n books.
10. Write a program that demonstrates the basic class program to get the department, name, and salary of an employee.
11. Create a class “Bank_Account” that contains Depositor_Name, Acc_No, Acc_type, and Balance as its data members. Also create member functions for account creation, deposit, withdrawal, and balance inquiry for the class. Demonstrate its use in the main.

12. Define a class “Time” that contains the following data members and member functions.
    a. Data members:
       Hours, Minutes, Seconds
    b. Member Functions:
       To get time from user, To display time on the screen, To calculate the sum of two-time objects.

Write a program that can read values of Time for two objects T1 and T2, calculate the sum, and display the sum using defined member functions.

13. Create a class “Sales” having the following data members and member functions:
    a. Data Members: Name of Salesman, Sales of Salesman
    b. Member functions to calculate commission
    c. Commission is Rs. 10 per thousand if sales are at least Rs. 25000 or more
    d. Commission is Rs. 5 otherwise.
    e. Write a program that calculates and prints names and sales of salesmen.
14. Write a program to count the number of objects created for a particular class using a constructor.
15. Create a class “Person” having two data members as person name and nationality. Also, create two constructors for this class in which one has two arguments and the second has one argument.
16. Write a program to declare two classes, each one has one int data member. Find the sum of data members of both classes using a friend function. Create suitable objects and functions.

17. Write a program which accepts the value of base and power from the user and displays its value (base^power) using a user-defined function.
18. Write a program that should work like a strlen function using a user-defined function.
19. Create a Class “Circle” having radius as data member, constructor, and member function to calculate the area of a circle. Class should overload == operator to compare two circle objects whether they are equal in radius.
20. Implement the following class relationship and test with the main class.

21. Write a program to demonstrate the handling of formatted I/O and unformatted I/O.
22. Write a program that creates and handles exceptions in C++.

Total: 30 Hours

Textbooks:

1. "C++ Primer", Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo, Addison-Wesley
2. "Accelerated C++: Practical Programming by Example", Andrew Koenig and Barbara E. Moo, Publication: Addison-Wesley",
3. “C++ How to Program", Paul J. Deitel and Harvey Deitel, Publication: Pearson

Reference Books:

1. C++ Primerby Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo, Pearson Education Asia
2. The C++ Programming Language by Bjarne Stroustrup, Addison–Wesley
3. Let Us C++ by Yashavant Kanitkar, BPB Publications

4. Beginning C++17: From Novice to Professional by Ivor Horton, Apress Publication

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Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

MCA

Semester-I

L-0 T-0 P-2 C-1

25MCA270P: Advanced Database Management Systems

Course Objectives

- To learn about Query Processing and Optimization.
- To understand Transaction Processing and Concurrency control.
- To learn Database backup and Recovery techniques.
- To understand Implementation Security in Databases.
- To learn and apply PL/SQL concepts.

Course Outcomes (COs)

Students will able to

1. Understand the creation and management of relational database tables with appropriate constraints and relationships.
2. Apply and execute SQL and PL/SQL commands to perform data manipulation, calculations, and constraint enforcement.
3. Analyze triggers and assertions to maintain data integrity and enforce business rules within the database.
4. Evaluate update database records to ensure accuracy and handle exceptional cases through procedural and conditional SQL operations.
5. Create reports on employee and department data using advanced SQL queries for statistical and analytical purposes.

Articulation Matrix

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

High-3 Medium-2 Low-1

Unit 1: Database Design and Table Creation

Introduction to Database Design, Creating Tables with Constraints, Referential Integrity.

Unit 2: Data Definition and Integrity Constraints

Adding and Modifying Table Columns, Integrity Constraints and Validations, Using SQL Commands to Alter Tables.

Unit 3: PL/SQL Programming and Triggers
Introduction to PL/SQL, Writing PL/SQL Programs for Calculations, Implementing Triggers for Data Validation.

Unit 4: Advanced SQL Operations and Data Management
Data Retrieval and Display, Aggregating Data and Calculating Averages, Handling Transactions.

Unit 5: Data Updates, Queries, and Exception Handling
Data Updates and Exception Handling, Advanced Queries and Data Retrieval, Managing Data Consistency.

List of Experiments:

A college consists of a number of employees working in different departments. In this context, create two tables' **employee and department**. Employee consists of columns empno, empname, basic, hra, da, deductions, gross, net, date-of-birth. The calculation of hra, da are as per the rules of the college. Initially only empno, empname, and basic have valid values. Other values are to be computed and updated later. Department contains deptno, deptname, and description columns. Deptno is the primary key in the department table and referential integrity constraint exists between employee and department tables. Perform the following operations on the database:

1. Create tables department and employee with required constraints.
2. Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command
3. Basic column should not be null
4. Add the constraint that the basic should not be less than 5000.
5. Calculate hra, da, gross and net by using PL/SQL program.
6. Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.
7. The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.
8. The percentage of hra and da are to be stored separately.
9. When the da becomes more than 100%, a message has to be generated and with user permission da has to be merged with basic.
10. Empno should be unique and has to be generated automatically.
11. If the employee is going to retire in a particular month, automatically a message has to be generated.
12. The default value for date-of-birth is 1 Jan, 1970.
13. When the employees called daily-wagers are to be added the constraint that salary should
    a. be greater than or equal to 5000 should be dropped.
14. Display the information of the employees and departments with description of the fields.
15. Display the average salary of all the departments.
16. Display the average salary department wise.
17. Display the maximum salary of each department and also all departments put together.
18. Commit the changes whenever required and rollback if necessary.

19. Use substitution variables to insert values repeatedly.
20. Assume some of the employees have given wrong information about date-of-birth.
    a. Update the corresponding tables to change the value.
21. Find the employees whose salary is between 5000 and 10000 but not exactly 7500.
22. Find the employees whose name contains 'en'.
23. Try to delete a particular deptno. What happens if there are employees in it and if there are no employees?

Total: 30 Hours

Reference Books:

1. Database Management Systems, Ramakrishnan, Gehrke, Third edition, McGraw Hill
2. SQL, PL/SQL – The programming Language Oracle-by Ivan Bayross.
3. Database System Concept- Silberscatz, Korth, Sudarshan , Fifth Edition, McGraw Hill.
4. Fundamentals of Database Systems, Elmsasri Navathe, Third edition, Addison Wesley.
5. Database Systems: Design , Implementation and Management , seventh edition , Peter
   Rob, Carlos Coronel, Thomson Course technology.

List of e-Learning Resources:

1. https://nptel.ac.in/
2. https://www.coursera.org/

Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

MCA

Semester-I

L-0 T-0 P-2 C-1

25MCA280P: Web Technologies

Course Objectives

- To understand basic concepts of HTML and CSS.
- To learn the basics of PHP.
- To learn modular programming and oops concepts.
- To work with forms.
- To learn about connecting applications to databases.

Course Outcomes (COs)

1. Understand HTML tags and basic PHP syntax.
2. Apply the structure of HTML documents and PHP data types.
3. Analyze HTML documents and use PHP to manipulate variables and loops.
4. Evaluate PHP functions and error handling concepts.
5. Create the use of sessions, cookies, and databases in web development.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	3	2	-	1	-	-	2	-	-	-	-
CO2	1	2	3	-	2	1	1	-	-	-	-	-
CO3	-	1	-	3	-	-	2	-	1	-	-	-
CO4	2	-	1	-	3	-	-	-	-	-	2	1
CO5	1	-	2	1	-	3	-	2	-	-	1	2

High-3 Medium-2 Low-1

Unit 1: HTML and CSS Basics

Introduction to HTML, HTML structure and elements, Creating basic web pages, CSS Fundamentals, CSS syntax and selectors, Styling HTML elements.

Unit 2: Basic PHP and Arithmetic Operations

Introduction to PHP, PHP syntax and basics, Embedding PHP in HTML, Basic Arithmetic Operations, PHP operators and expressions.

Unit 3: Conditional Statements and Loops in PHP

Conditional Statements (If-else statements, Switch-case statements), Looping Constructs(For loop, While loop)

Unit 4: Functions and Advanced PHP Concepts
Functions in PHP, Defining and invoking functions, Function parameters and return values, Arrays and String Manipulations, Advanced PHP Concepts.

Unit 5: Dynamic Web Development with PHP and MySQL
Introduction to PHP, PHP syntax and basics, Embedding PHP in HTML, PHP and MySQL Integration, Connecting to a MySQL database, Performing CRUD operations, Advanced Web Development, Using PHP, Ajax, and PHP together, Creating dynamic and interactive web applications.

List of Experiments

1. Write an HTML/CSS program to create a registration form.
2. Write an HTML/CSS program to create a login form.
3. Create a portfolio website of your own using HTML/CSS.
4. Write a program for simple arithmetic operations.
5. Write a program for finding the greatest number among two numbers.
6. Write a program for the greatest number among the three numbers.
7. Write a program for finding an even or odd number.
8. Write a program for finding leap years.
9. Write a program for swap two numbers using a third variable.
10. Write a program for swapping two numbers without a third variable.
11. Write a program to generate multiplication of the table which is given by the user.
12. Write a generated multiplication of the table with the given condition.
13. Write a program to check if a given number is prime or not?
14. Write a program for printing Fibonacci series?
15. Write a program to find the sum & average of array elements?
16. Write a program for finding areas of shapes using functions. a. Rectangle b. Square c. Circle d. 4. Triangle
17. Write a program for finding areas of shapes using switch cases. a. Rectangle b. Square c. Circle d. Triangle
18. Write a program for arithmetic operation using switch cases.
19. Write a program for arithmetic operation using functions.
20. Write a program to swap two numbers using a third variable using a function?
21. Write a program to swap two numbers without using a third variable using a function.
22. Create a user Registration form (Field Name: FirstName, LastName, Username, Email, Password, Address) with MySQL database connection. .
23. Create a user Login form (Field Name: Username, Password. Note: Username and a. Password must be 7 characters/digits) with MySQL database connection.
24. Make a final dynamic website using HTML, CSS CSS, PHP.

Total: 30 Hours

Reference Books:

1. Learning PHP, MySQL, By O' riley Press
2. Eric Filson , Erick Rosebrock, Setting up LAMP: Getting Linux, Apache, MySQL, and PHP Working Together, SyBex (2004).
3. Matt Doyle, Beginning PHP 5.3, Wiley (2010).

List of e-Learning Resources:

1. https://nptel.ac.in/
2. https://www.coursera.org/

Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

MCA

Semester-I

L-0 T-0 P-8 C-4

25MCA380P: Client-Side Scripting Lab

Course Objectives:

- To learn about JavaScript's values, types, and operators through practical applications.
- Understand the control flow structures in JavaScript including conditional execution.
- To learn and utilize JavaScript functions, objects, and arrays to solve problems.
- To understand higher-order functions in JavaScript to achieve code abstraction.
- To learn and manipulate objects in JavaScript using encapsulation, prototypes.

Course Outcomes:

Students will able to

1. Understand JavaScript's basic elements, including values, data types, and operators.
2. Apply JavaScript's program structure and control flow concepts to solve problems.
3. Analyze JavaScript functions, data structures, and recursion in various programming scenarios.
4. Evaluated higher-order functions for data transformation and abstraction in JavaScript.
5. Create JavaScript programs and classes, implementing object-oriented principles.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	3	-	2	-	2	-	1	-	-	-	-
CO2	-	2	3	-	1	-	2	-	-	-	-	-
CO3	2	1	2	3	-	-	1	-	2	-	-	-
CO4	1	-	2	-	3	-	1	1	2	-	-	-
CO5	1	2	-	2	-	3	-	-	1	-	-	-

High-3 Medium-2 Low-1

Unit-I : Java Script — 24 Hours

Introduction, Applications. Values, Types, and Operators Values, Numbers, Strings, Unary operators, Boolean values, Empty values, Automatic type conversion.

Unit-II :Program Structure — 24 Hours

Expressions and statements, Bindings, Binding names, the environment, Functions, the console.log function, return values, Control flow, Conditional execution, while and do loops, Indenting Code, for loops, Breaking Out of a Loop, Updating bindings succinctly. Dispatching on a value with switch, Capitalization, Comments.

Unit-III :Functions — 24 Hours

Defining a function, Bindings and scopes, Functions as values, Declaration notation, Arrow functions, the call stack, Optional Arguments, Closure, Recursion, Growing functions, **Data Structures**: Objects and Arrays The were squirrel, Data sets, Properties, Methods, Objects,

Mutability, Computing correlation, Array loops, The final analysis, Further arrayology, Strings and their properties, Rest parameters, The Math object, Destructuring, JSON.

Unit-IV :Higher-Order Functions **24 Hours**

Abstraction, Abstracting repetition, Higher-order functions, Script data set, filtering arrays, transforming with map, summarizing with reduce, Composability, Strings and character codes, Recognizing text.

Unit-V: Advanced OOP **24 Hours**

Objects Encapsulation, Methods, Prototypes, Classes, Class notation, overriding derived properties. Maps, Polymorphism, Symbols, The iterator interface, Getters, setters, and statics, Inheritance, The instance of operator.

List of Experiments:

1. JavaScript Program to Print Hello World
2. JavaScript Program to Add Two Numbers
3. JavaScript Program to Find the Square Root
4. JavaScript Program to Calculate the Area of a Triangle
5. JavaScript Program to Swap Two Variables
6. JavaScript Program to Convert Celsius to Fahrenheit
7. JavaScript Program to Generate a Random Number
8. JavaScript Program to Check if a number is Positive, Negative, or Zero
9. JavaScript Program to Check if a Number is Odd or Even
10. JavaScript Program to Find the Largest Among Three Numbers
11. JavaScript Program to Guess a Random Number
12. JavaScript Program to Display Fibonacci Sequence Using Recursion
13. JavaScript Program to Convert Decimal to Binary
14. JavaScript Program to Find ASCII Value of Character
15. JavaScript Program to Check Whether a String is Palindrome or Not
16. JavaScript Program to Replace Characters of a String
17. JavaScript Program to Reverse a String
18. JavaScript Program to Check the Number of Occurrences of a Character in the String
19. JavaScript Program to Convert the First Letter of a String into Uppercase
20. JavaScript Program to Perform Case Insensitive String Comparison
21. JavaScript Program to Replace All Line Breaks with
22. JavaScript Program to Display Date and Time
23. JavaScript Program to Check Leap Year
24. JavaScript Program to Format the Date
25. JavaScript Program to Display Current Date
26. JavaScript Program to Compare the Value of Two Dates
27. JavaScript Program to Create Countdown Timer
28. JavaScript Program to Remove Specific Item from an Array
29. JavaScript Program to Check if An Array Contains a Specified Value
30. JavaScript Program to Insert Item in an Array
31. JavaScript Program to Append an Object to An Array
32. JavaScript Program to Empty an Array
33. JavaScript Program to Add Element to Start of an Array
34. JavaScript Program to Remove Duplicates from Array
35. JavaScript Program to Merge Two Arrays and Remove Duplicate Items
36. JavaScript Program to Sort Array of Objects by Property Values

37. JavaScript Program to Create Two-Dimensional Array
38. JavaScript Program to Split Array into Smaller Chunks
39. JavaScript Program to Get File Extension
40. JavaScript Program to Check If a Variable Is undefined or null
41. JavaScript Program to Set a Default Parameter Value for a Function
42. JavaScript Program to Generate a Random Number Between Two Numbers
43. JavaScript Program to Get the Current URL
44. JavaScript Program to Check If a Variable is of Function Type
45. JavaScript Program to Work with Constants
46. JavaScript Program to Perform Function Overloading
47. JavaScript Program to Check if a Number is Float or Integer
48. JavaScript Program to Pass a Function as Parameter
49. JavaScript Program to Remove All Whitespaces from a Text
50. JavaScript Program to Convert Date to Number

Total: 120 Hours

Reference Books:

1. JavaScript &JQuery: Interactive Front-End Web Development by Jon Duckett, Wiley publications.
2. JavaScript: The Definitive Guide, David Flanagan, O'Reilly Media, Inc.
3. You Don't Know JS: Up and Going, by Kyle Simpson, O'Reilly Media, Inc.
4. JavaScript ñ A Beginners Guide ñ John Pollock, McGraw-Hill.

List of e-Learning Resources:

1. https://nptel.ac.in/
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