SEMESTER –IV

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
CC204	**Relational Database Management System(RDBMS)**	1	0	2	2	**Int**	**Uni**	**Total**	**Int**	**Uni**
						--	--	--	--	50
Course Outcomes (COs):	CO1: Understand the Core Concepts of RDBMS CO2: Demonstrate different types querris useing Relational Database.									
Prerequisite	Basic knowledge of Set Theory and DBMS									Hrs.
UNIT I	Introduction to RDBMS: Definition, Constraints in a RDBMS: Primary Key, Foreign Key,Unique Key, NOT NULL, CHECK, SQL Basics: DDL,DML,DCL,TCL and DQL									15
UNIT II	Advace SQL: Math functions, string functions Aggregate Functions (Min(), Max(), Sum(), Avg(), Count()), Logical operators (AND, OR, NOT), Predicates (In, Like, Between, Alias, Distinct), Clauses(Group By, Having, Order by, top/limit), Inner Join, Natural Join, Full Outer Join, Left Outer Join, Right outer Join, Equi Join,Set Operations, Views, Introduction to PL/SQL, Cursor, trigger, stored procedure and functions									15
TextBooks/ Reference Books	1.Raghu Ramakrishnan, Johannes Gehrke, “Database Management Systems”, third edition, McGraw – Hill, 2018 2.Benjamin Rosenzweig, Elena Rakhimov, “Oracle PL/SQL by Example”, fifth edition, Prentice Hall, 2015 3.Korth, Silbertz, Sudarshan,” Database System Concepts”, Seventh Edition, McGraw - Hill.(2019) 4.R.P. Mahapatra, Govind Verma, “Database Management Systems”, Khanna Publishing House, 2025.									
Web Resources	1.https://oracle-base.com/articles 2.https://forums.oracle.com/ords/apexds/domain/dev- community/category/sql_and_pl_sql 3.https://asktom.oracle.com/ords/f?p=100:1:0									

CC204: Relational Database Management System(RDBMS) Lab

DDL Commands

Consider the following Schema Supplier(SID, Sname, branch, city, phone) Part(PID, Pname, color, price) Supplies(SID, PID, qty, date_supplied)
Create the above tables
Add a new attribute state in supplier table
Remove attribute city from supplier table
Modify the data type of phone attribute
Change the name of attribute city to address
Change a table's name, supplier to sup
Use truncate to delete the contents of supplies table
Remove the part table from database

DML Commands

1.Insert at least 10 records in tables supplier, part and supplies
2.Show the contents in tables supplier, part and supplies
3.Find the name and city of all suppliers
4.Find the name and phoneno of all suppliers who stay in 'Delhi'
5.Find all distinct branches of suppliers
6.Delete the record of the supplier whose SID is 204001
7.Delete all records of supplier table
8.Delete all records of suppliers whose city starts with capital A.
9.Find the supplier names which have 'lk' in any position
10.Find the supplier name where 'R' is in the second position
11.Find the name of supplier whose name starts with 'V' and ends with 'A'
12.Change the city of all suppliers to 'BOMBAY'
13.Change the city of supplier 'Vandana' to 'Goa'

Queries with Constraints

1.Create the supplier table with Primary Key Constraint
2.Create supplies table with Foreign key Constraint
3.Create a part table with UNIQUE Constraint
4.Create supplier Table with Check Constraints
5.Create Supplier table with Default Constraint

Queries on TCL

1.Create Savepoints
2.Rollback to SavePoints
3.Use Commit to save on Aggregate Functions:
4.Find the minimum, maximum, average and sum of costs of parts
5.Count the total number of parts present
6.Retrieve the average cost of all parts supplied by 'Mike' Queries on GROUP BY,

HAVING AND ORDER BY Clauses

1.Display total price of parts of each color
2.Find the branch and the number of suppliers in that branch for branches which have more then 2

suppliers
3.Find all parts sorted by pname in ascending order and cost in descending order
4.Find the branch and the number of suppliers in that branch Queries on Analytical,

Queries on Operators

1.Find the pname, phoneno and cost of parts which have cost equal to or greater than 200 and less than or equal to 600.
2.Find the sname , SID and branch of suppliers who are in 'local' branch or 'global' branch
3.Find the pname, phoneno and cost of parts for which cost is between 200 and 600
4.Find the pname and color of parts, which has the word 'NET' anywhere in its pname.
5.Find the PID and pname of parts with pname either 'NUT' or 'BOLT'
6.List the suppliers who supplied parts on '1st may2000', '12 JAN 2021' ,'17 dec 2000','10 Jan 2021'
7. Find all the distinct costs of parts

Join Operators

1. Perform Inner join on two tables
2.Perform Natural Join on two tables
3.Perform Left Outer Join on tables
4.Perform Right Outer join on tables
5.Perform Full Outer Join on tables Set Theory Operators
6.Show the use of UNION operator with union compatibility
7.Show the use of intersect operator with union compatibility
8.Show the use of minus operator with union compatibility
9.Find the Cartesian product of two tables

Demonstration on PL/SQL block, cursor, trigger, functions and stored procedure.

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
CC205	Computer Networks	3	0	0	3	**Int**	**Uni**	**Total**	**Int**	**Uni**
						15	60	75	--	--
Course Outcomes (COs):	**CO1:** Understand the fundamental concepts of Computer Networks and their applications. **CO2:** Develop problem-solving skills related to network design, implementation, and Troubleshooting. **CO3:** Implement network protocols and configure network devices **CO4**: Identify the applications of Networking with its management.									
Prerequisite	1. **Basic Networking Knowledge:** Familiarity with basic networking concepts such as IP addressing and network topologies. 2. **Programming Skills:** Ability to write basic network programs and scripts in languages suchas Python or C. 3. **Operating Systems**: Understanding of OS concepts related to networking, such as processmanagement and memory allocation									Hrs.
UNIT I	**Introduction to Computer Networks**: Definition and Objectives, Applications and Examples. Network Components and Architecture. **Network Models:** OSI Model: Layers and Functions, TCP/IP Model: Layers and Functions, Comparison between OSI and TCP/IP Models. **Network Topologies:** Physical vs. Logical Topologies, Common Topologies: Star, Ring, Bus,Mesh, Hybrid, Advantages and Disadvantages of Each Topology. **Data Transmission:** Analog vs. Digital Signals.**Transmission Modes**: Simplex, Half-Duplex,Full-Duplex, Bandwidth and Latency. **Networking Devices:** Routers, Switches, Hubs, Bridges, Gateways, Functions andConfigurations of Each Device.									5
UNIT II	**Data Link Layer and Networking Protocols** **Data Link Layer Fundamentals**: Functions of the Data Link Layer, Framing, Error Detection,and Error Correction, Flow Control Mechanisms.**Ethernet**: Ethernet Standards and Frame Structure, MAC Addressing and ARP, **Ethernet Switching**: Basic Concepts and Methods. **Network Protocols**: Introduction to TCP/IP Protocol Suite, IP Addressing: IPv4 and IPv6. Sub-netting and CIDR Notation. **Address Resolution Protocol (ARP):** ARP Operation and Table, ARP Spoofing and Security, Considerations **Virtual LANs (VLANs):** Concept of VLANs, VLAN Tagging and Configuration, Benefits andUse Cases.									15
UNIT III	**Network Layer and Transport Layer** **Network Layer:** IP Routing: Static vs. Dynamic Routing,Routing Protocols: RIP, OSPF, BGP,Network Address Translation (NAT). **Transport Layer**: TCP vs. UDP: Characteristics and Use Cases, TCP Handshake andConnection Management, Flow Control and Congestion Control in TCP. **Congestion Control Algorithms &Techniques:** Slow Start, Congestion Avoidance, Fast Retransmit, Fast Recovery, **TCP Variants:** TCP Reno, TCP Vegas.**Quality of Service (QoS):** QoS Principles and Mechanisms, Differentiated Services (DiffServ), and Integrated Services (IntServ) **Network Security Fundamentals:** Threats and Vulnerabilities, Basic Security Mechanisms:Firewalls, VPNs, Encryption.									15
UNIT IV	**Application Layer and Emerging Technologies** **Application Layer Protocols:** HTTP/HTTPS: Structure and Operation, FTP, SMTP, POP3,IMAP: Protocols and Uses, DNS: Domain Name System and Resolution **Network Applications:** Web Browsing, Email Communication, File Transfer, Voice over IP(VoIP) and Streaming.**Emerging Technologies:** Software-Defined Networking (SDN),									10

	Network FunctionVirtualization (NFV), Internet of Things (IoT) and Its Impact on Networking **Network Management**: SNMP, Simple Network Management Protocol, Network Monitoring, Tools and Techniques.**Future Trends in Networking**: 5G and Beyond, Network Automation and ArtificialIntelligence in Networking.	
TextBooks/ Reference Books	1. Andrew S. Tanenbaum, "Computer Networks", 5th Edition, Pearson Education, 2011. 2. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach", 8th Edition, Pearson, 2021. 3. Behrouz A. Forouzan, "Data Communications and Networking", 5th Edition, McGraw-HillEducation, 2012. 4. Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach", 6th Edition, Morgan Kaufmann, 2019. 5. Bhavneet Sidhu, An Integrated Approach to Computer Networks, Khanna PublishingHouse, 2023. 6. Mastering PC Hardware & Networking, Khanna Publishing House, 2024.	
Web Resources	1. Cisco Networking Academy - Online Courses and Resources 2. NetworkLessons.com - Tutorials on Various Networking Topics	

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
CC206	**Design and Analysis of Algorithms**	3	0	0	3	**Int**	**Uni**	**Total**	**Int**	**Uni**
						15	60	75	--	--
Course Outcomes (COs):	CO1: To impart to students the understanding of basic algorithm designing paradigms. CO2: Identify basic knowledge on how to analyse an algorithm. CO3: To enable a student to synthesize efficient algorithms in commondesign situations and real-life problems. CO4: Identify the limitations of algorithms in solving specific problems.									
Prerequisite	Knowledge of Data Structures									Hrs.
UNITI	What is an algorithm? Design and performance analysis of algorithms, time complexity, spacecomplexity.Asymptotic notations (O, Ω, Θ) to measure growth of a function and application to measure complexity of algorithms. Analysis of sequential search, bubble sort, selection sort, insertion sort, matrix multiplication. **Recursion:** Basic concept. Analysis of recursive algorithms, Master's theorem.									10
UNITII	**The Divide & Conquer Design Technique:**The general concept. Binary search, finding the maximum and minimum, merge sort, quick sort.Best and worst case analysis for the mentioned algorithms. Strassen's matrix multiplication.Lower bound for comparison-based sorting. **The Greedy Design Technique:**The general concept. Applications to general Knapsack problem, finding minimum weightspanning trees: Prim's and Kruskal's algorithms, Dijkstra's algorithm for finding single sourceshortest paths problem.									15
UNITIII	**The Dynamic Programming Design Technique:**The general concept, Computation of Fibonacci series and Binomial coefficients, all pairshortest paths problem (Floyd-Warshall's algorithm), 0/1 Knapsack problem.Breadth First Search, Depth First Search, finding connected components, depth first search of adirected graph, topological sorting.									15
UNITIV	**Limitations of Algorithmic Power:**Back tracking Method: n-Queen problem; sum of subsets problem/ Hamiltonian circuitproblem/vertex cover problem. Computational Intractability: Overview of non-deterministic algorithms, P, NP, NP-Completeand NP-hard problems.									5
TextBooks/ ReferenceBooks	1. Gajendra Sharma, Design and Analysis of Algorithms, Khanna Publishing House(AICTE Recommended Textbook) 2. Cormen Thomas H., Leiserson Charles E., Rivest Ronald L. and Stein Clifford,Introduction to Algorithms, PHI publication, 3rd Edition, 2009. 3. Horowitz Ellis, Sahni Sartaj and Rajasekaran Sanguthevar, Fundamentals of ComputerAlgorithms, University Press (I) Pvt. Ltd., 2012. 4. Levitin Anany, Introduction to Design and Analysis of Algorithms, 3rd Edition, Pearson,2012 5. Aho Alfred V., Hopcroft John E. & Ullman Jeffrey D., The Design & Analysis ofComputer Algorithms, Addison Wesley Publications, Boston, 1983. 6. Kleinberg Jon & Tardos Eva, Algorithm Design, Pearson Education, 2006.									
Web Resources	1. https://nptel.ac.in/courses/106101060 2. https://www.cs.umd.edu/~mount/451/Lects/451lects.pdf									

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
CC207	**Artificial Intelligence**	3	0	4	5	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100	--	50
Course Outcomes (COs):	CO1: Understand the characteristics of rational agents, and the environment in which they operate, and gain insights about problem-solving agents. CO2: Gain insights about Uninformed and Heuristic search techniques and apply them to solve search applications. CO3: Obtain insights about the knowledge representation using Propositional logic, Predicate calculus and probabilistic reasoning through fuzzy logic. CO4: Obtain a basic understanding of the AI domains and their applications and examine the legal and ethical issues of AI									
Prerequisite	Basic understanding of computer science concepts, including data structures and algorithms. Proficiency in minimum one programming language, such as Python.									Hrs.
UNIT I	Introduction to AI: What is AI? Intelligent Agents: Agents and environment, the concept of Rationality, the nature of environment, the structure of Agents. Knowledge-Based Agents: Introduction to Knowledge-Based Agents, The Wumpus World as an Example World. Problem-solving: Problem-solving agents.									15
UNIT II	Advanced Search Techniques Uninformed Search: DFS, BFS and Iterative Deepening Search. Informed Search: Best First Search, A* search, AO* search. Adversarial Search & Games: Two-player zero-sum games, Minimax Search, Alpha-Beta pruning. Constraints and Constraint Satisfaction Problems (CSPs), Backtracking search for CSP. Evolutionary Search Techniques: Introduction to evolutionary algorithms, Genetic algorithms, Applications of evolutionary search in AI.									15
UNIT III	Logical Reasoning and Uncertainty Logic: Propositional logic, First-order predicate logic, Propositional versus first-order inference, Unification and lifting. Inference: Forward chaining, Backward chaining, Resolution, Truth maintenance systems. Introduction to Planning: Blocks World problem, Strips; Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, Introduction to Fuzzy set theory.									15
UNIT IV	AI Domains and Applications of AI Domains: Introduction to Machine Learning, Computer Vision, Robotics, Natural Language Processing, Deep Neural Networks, and their Applications. Expert Systems: The architecture and role of expert systems include two case studies. Legal and Ethical Issues: Concerns related to AI.									15
TextBooks/ Reference Books	1. M.C. Trivedi, A Classical Approach to Artificial Intelligence, Khanna Book Publishing Company, 2024 (AICTE Recommended Textbook). 2. Nilsson Nils J, Artificial Intelligence: A new Synthesis, Morgan Kaufmann Publishers Inc. San Francisco, CA, ISBN: 978-1-55-860467-4. 3. Dan W Patterson, Introduction to Artificial Intelligence & Expert Systems, PHI Learning 2010. 4. Rajiv Chopra, Data Science with Artificial Intelligence, Machine Learning and Deep Learning, Khanna Book Publishing Company, 2024. 5. M.C. Trivedi, Introduction to AI and Machine Learning, Khanna Book Publishing Company, 2024.									

	6. Russell, S. and Norvig, P., "Artificial Intelligence - A Modern Approach", 3rd edition, Prentice Hall 7. Van Hirtum, A. & Kolski, C. (2020). Constraint Satisfaction Problems: Algorithms and Applications. Springer 8. Rajiv Chopra, Machine Learning and Machine Intelligence, Khanna Book Publishing Company, 2024.

CC207: Artificial Intelligence LAB Experiments
1. Demonstrate basic problem-solving using Breadth-First Search on a simple grid. 2. Implement Depth-First Search (DFS) on a small graph. 3. Solve the Water Jug Problem using Breadth First Search (BFS). 4. Implement a Hill Climbing search to find the peak in a numeric dataset. 5. Apply the A* Search algorithm to find the shortest path in a 4x4 grid. 6. Implement the Minimax search algorithm for 2-player games. You may use a game tree with 3 plies. 7. Solve the 4 – Queens Problem as a CSP backtracking problem. 8. Use constraint propagation to solve a Magic Square puzzle. 9. Apply optimization techniques to find the maximum value in a list. 10. Represent and evaluate propositional logic expressions. 11. Implement a basic rule-based expert system for weather classification.

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSE202.1	**Professional Elective – II** Data Visualization	4	0	4	6	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100	50	--
Course Outcomes (COs):	CO1: Understand the role of Power BI in data visualization and its importance. CO2: Explore the ethical considerations and challenges in data visualization. CO3: Learn about visual perception and its impact on data interpretation. CO4: Study different types of visualizations and their appropriate uses.									
Prerequisite	Familiarity with using a computer, including file management and basic software navigation. Basic knowledge of data structures, such as tables and databases. Basic understanding of data analysis concepts and familiarity with data types									Hrs
UNIT I	**Introduction to Power BI** Introduction to Power BI: Overview of Business Intelligence (BI), Introductionto Power BI and its components, Installing and setting up Power BI Desktop., Data Preparation and Transformation: Connecting to various data sources(e.g. Databases, Excel and Web services), Data loading and transformation usingPower Query Editor, Data cleansing and shaping techniques.									15
UNIT II	**Introduction to Data Visualization** Definition and importance of data visualization-Role of data visualization in decision making-Types of data (numerical, categorical, temporal, geographical)-Data visualization process (datacollection, exploration, analysis, visualization, interpretation)-Challenges and limitations of datavisualization.									15
UNIT III	**Visualization tools & Data Storytelling** Overview of Visualization Tools (e.g., Excel, Tableau, Power BI, Python)- Comparing and Contrasting features and Use Cases among these tools.Principles of Data Storytelling: Narrative and Context-Best Practices for Dashboard Layout andInteractivity.									15
UNIT IV	**Designing Effective Visualizations** Principles of Good Visualization Design - Understanding and Using Color in Visualizations –Importance of Data Modeling in Visualization.									15
TextBooks/ Reference Books	1. Storytelling with Data: A Data Visualization Guide for Business Professionals Cole Nussbaumer Knaflic, Wiley; 1st edition, 2015. 2. “The Visual Display of Quantitative Information” by Edward Tufte, Graphics Press USA; 2nd edition, 2001. 3. Data Visualization: A Practical Introduction" Kieran Healy, Princeton University Press,2018. 4. Analyzing Data with Power BI and Power Pivot for Excel", Alberto Ferrari and Marco Russo, Microsoft Press; 1st edition, 2017. 5. Microsoft Power BI Complete Reference", Devin Knight, Brian Knight, Mitchell Pearson, and Manuel Quintana, Packt Publishing; 1st edition, 2018									
Web Resources	1. https://learn.microsoft.com/en-us/power-bi/ 2. https://www.storytellingwithdata.com/ 3. https://jpsm.umd.edu/sites/jpsm.umd.edu/files/syllabi/Syllabus_Introduction%20to%20Data%20Visualization_Spring%202024.pdf									

DSE202.1 Professional Elective – II Data Visualization Program List
Introduction to Power BI Interface and Basics 1. Installation and interface overview 2. Exploring the Power BI workspace: Ribbon, panes, and canvas. 3. Importing data from Excel and CSV files. 4. Introduction to multiple data sources 5. Basic report creation: Adding visuals and saving a report. **Data Transformation and Preparation** 1. Using Power Query Editor 2. Cleaning data: Removing duplicates, handling missing values. 3. Transforming data: Splitting columns, changing data types, renaming columns. 4. Merging and appending queries. 5. Creating custom columns and calculated columns **Data Modeling** 1. Creating relationships between tables 2. Identifying and resolving data inconsistencies 3. Creating calculated columns and measures **Creating Basic Visualizations** 1. Creating various chart types (bar, column, line, pie, area, etc.,) 2. Formatting and customizing visualizations Publishing and Sharing Reports 3. Publishing a report to Power BI Service. 4. Sharing reports and dashboards with team members. 5. Setting up data refresh schedules and managing permissions.

Course Code	**Cours Title**	**L**	**T**	**P**	**Credit**	**Theory**			**Practical**	
DSE202.2	**Professional Elective–II** Introduction to ML	4	0	4	6	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100	50	--
Course Outcomes (COs):	CO1: Define and explain machine learning concepts,types and types of Dataset. CO2: Implement and apply supervised and unsupervised learning techniques CO3: Develop and evaluate simple machine learning models CO4: Analyze Neural Networks and apply appropriate machine learning algorithms depending on the problems with some real-world data									
Prerequisite	Knowledge of different AI Domains and their Applications									Hrs
UNIT I	**Introduction to Machine Learning** Introduction:Definition, History and Application of Machine Learning Types of Machine Learning (Supervised, Unsupervised, Semi-Supervised, and Re inforcement Learning) Types of Datasets(Labeled and Unlabeled Datasets)									15
UNIT II	**Supervised Learning and Unsupervised Learning** Regression(LinearandNon-LinearRegression),LogisticRegression,Classification									15

	Algorithms (Naive Bayes, K-Nearest Neighbors, Decision Trees) Clustering Algorithms(K-Means,Hierarchical Clustering, DBSCAN,Clustering Validation Measures)	
UNIT III	**MLModels and Performance Evalu ation Parameters** Training,Validation and Testingo fMLModels Performance Evaluation Parameters(Confusion Matrix, Accuracy, Precision, Recall, F1 Score, AUC)	15
UNIT IV	**Neural Networks** Introduction to Neural Networks Ethical Considerations in MachineLearning CaseStudy and Real-WorldApplications	15
TextBooks/ Reference Books	1. SenseofData.CambridgeUniversityPress.ISBN:9781107422223, 2012. 2. Duda, R. O.,Hart,P.E., Stork,D(2007).Patternclassification(2Ed),JohnWiley& Sons, ISBN-13: 978-8126511167. 3. HaykinS.(2009).NeuralNetworksandLearningMachines,ThirdEdition,PHI Learning. 4. Chollet,F. (2018).DeepLearningwithPython. Manning Publications. 5. Bishop,C.M.(2006).PatternRecognitionandMachineLearning. Springer. 6. Goodfellow,I., Bengio, Y.,&Courville, A. (2016).DeepLearning. MIT Press. 7. Géron,A.(2017).Hands-OnMachineLearningwithScikit-Learnand TensorFlow: 8. Concepts,Tools,andTechniquestoBuildIntelligentSystems*(1sted.).O'Reilly Media	
Web Resources	1. https://www.coursera.org/learn/machine-learning 2. https://www.udacity.com/course/aws-machine-learning	

DSE202.2 Introduction to ML Laboratory

1. Use the any numerical dataset with one dependent variable and one independent variable and implement a linear regression model. Visualize the data points and plot the regression line.
2. Choose any binary classification dataset (useonlytwoclasses). Implement logistic regression.Plot the decision boundary between the two classes.
3. Choose any classification dataset.Implement a decision tree classifier and Visualize the decision tree
4. Implement Naïve Bayes classifier on any text classification dataset.
5. Implement a random forest classifier using a numerical dataset.
6. Implement a support vectormachine for linearly separable classes and visualize decision boundary along with the margins
7. Implement K-Means clustering on a point dataset and visualize and evaluate the clusters.
8. Implement hierarchical clustering on a dataset and plot the dendrogram.
9. Implement DBSCAN clustering on a dataset and visualize and evaluate the clusters.
10. Use the Iris Dataset or another numerical dataset. Implement PCAtoreducethe dimensionalityof the dataset. Applyanyclassifierbeforeandafter PCA.Evaluate and compare performance emetrics (e.g., accuracy) before and after PCA
11. Build asingle layer perceptronmodelto classifyAND, OR, and XOR problems(mayuse Tens or Flow/Keras) and visualize their decision boundaries.Also evaluate its performance.
12. Demonstrate the concept of boosting using the AdaBoost algorithm

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSE201.3	**Professional Elective–II** Web Programming II	4	0	4	6	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100	50	--
Course Outcomes (COs):	CO1: To Understand the fundamentals of PHP programming language. CO2: To develop PHP applications using Error handling. CO3: To design object-oriented programming (OOP) principles for PHP CO4: To understand data abstraction using interfaces and abstract class.									
Prerequisite	Basics of web application development, scripting language and object-oriented programming (OOP)									Hrs
UNIT I	**Introduction to PHP and Web Development** History and evolution of PHP, Server-side scripting and client-side scripting, PHP syntax and structure, PHP Installation and Configuration, Installing PHP (Windows and Linux), PHP Development Environments (XAMPP, WAMP, LAMP) PHP Basics- PHP Syntax and Structure, Embedding PHP in HTML, PHP tags and comments, Variables, constants, and data types (strings, integers, floats, booleans) Operators (arithmetic, logical, comparison), Control Structures- Conditional statements (if, else, switch), Loops (for, while, do-while, foreach),Break, continue, and exit statements									15
UNIT II	**Functions and Arrays** Functions- Defining and calling functions, Function parameters and return values, Variable scope (global vs local), Built-in PHP functions (string manipulation, array functions, etc.) Arrays and Data Structures- Indexed Arrays, Creating, accessing, and modifying indexed arrays, Looping through arrays (foreach, for), Associative Arrays, Creating, accessing, and modifying associative arrays, Sorting and filtering arrays (array_merge, array_sort, array_filter),Multidimensional Arrays, Creating and accessing multidimensional arrays, Array Functions, Array manipulation functions (array_map, array_reduce, array_walk)									15
UNIT III	**Object-Oriented Programming (OOP) in PHP** Introduction to OOP, Object-Oriented Programming (OOP)Defination, Classes and objects, Basic OOP Concepts, Properties and methods, Constructor and destructor methods. Access modifiers (public, private, protected), Static properties and methods, Inheritance, Creating subclasses and extending parent classes, Polymorphism using method overriding and overloading, Interfaces and abstract classes, Encapsulation, Getter and setter methods.									15
UNIT IV	**Error Handling and Debugging** PHP Error Types, Notices, warnings, and fatal errors, Setting error reporting levels, Exception Handling, Using try, catch, finally blocks, Throwing and catching exceptions Custom exception classes, Debugging Tools, Using var_dump(), print_r(), die(), and debug_backtrace(), Introduction to Xdebug for step-by-step debugging, Logging errors to files									15
TextBooks/ Reference Books	1. Steven Holzner, "PHP: The Complete Reference Paperback", McGraw Hill Education (India), 2007. 2. David Sklar, Adam Trachtenberg, "PHP Cookbook: Solutions & Examples for PHP Programmers", 2014. 3. Object-oriented PHP by Peter Lavin 2006 O'Reilly Publication 4. Programming PHP by Rasmus Lerdorf, Kavin Tatrroe & Peter Maclntyre O'Reilly Publication									

DSE202.3 Web Programming II Laboratory

1. Create a PHP page using functions for comparing three integers and print the largest number.
2. Write a function to calculate the factorial of a number (non-negative integer). The function accept the number as an argument.
3. WAP to check whether the given number is prime or not.
4. Create a PHP page which accepts string from user. After submission that page displays the reverse of provided string.
5. Write a PHP function that checks if a string is all lower case.
6. Write a PHP script that checks whether a passed string is palindrome or not? (A palindrome is word, phrase, or sequence that reads the same backward as forward, e.g., madam or nurses run)
7. Write a PHP script to sort an array.
8. Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e.name is present in the database) otherwise error message should be displayed.
9. Create a simple 'birthday countdown' script, the script will count the number of days between current day and birth day.
10. Create a script to construct the following pattern, using nested for loop.

* *

* * *

* * * *

11. Write a PHP class 'Rectangle' that has properties for length and width. Implement methods to calculate the rectangle's area and perimeter.
12. Write a PHP class called 'Shape' with an abstract method 'calculateArea()'. Create two subclasses, 'Triangle' and 'Rectangle', that implement the 'calculateArea()' method.
13. Write a PHP interface called 'Resizable' with a method 'resize()'. Implement the 'Resizable' interface in a class called 'Square' and add functionality to resize the square.
14. Write a PHP a class hierarchy for a library system, including classes like 'LibraryItem', 'Book', 'DVD', etc. Implement appropriate properties and methods for each class.
15. Write a PHP abstract class called 'Animal' with abstract methods like 'eat()' and 'makeSound()'. Create subclasses like 'Dog', 'Cat', and 'Bird' that implement these methods.
16. Write a class called 'Employee' that extends the 'Person' class and adds properties like 'salary' and 'position'. Implement methods to display employee details.
17. Write a class called 'Math' with static methods like 'add()', 'subtract()', and 'multiply()'. Use these methods to perform mathematical calculations.
18. Write a PHP class called 'Calculator' that has a private property called 'result'. Implement methods to perform basic arithmetic operations like addition and subtraction.
19. Write a PHP class called 'ShoppingCart' with properties like 'items' and 'total'. Implement methods to add items to the cart and calculate the total cost.
20. Write a class called 'Validation' with static methods to validate email addresses, passwords, and other common input fields.
21. Write a PHP program that demonstrates the basic usage of try-catch blocks to handle exceptions.
22. Write a PHP program that implements a PHP function that divides two numbers but throws an exception if the denominator is zero.
23. Write a PHP script that uses try-catch blocks to handle different types of exceptions and display appropriate error messages.
24. Write a PHP program that reads data from a file and throws a custom exception if the file does not exist.

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
SEC202	**DesignThinking and Innovation**	0	0	2	1	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	30	50	--	--
Course Outcomes (COs):	CO1: Understand design-based thinking approach to solve problems CO2: Propose real-time innovative product designs and Choose appropriate frameworks, strategies, techniques during prototype development. CO3: Understand the importance of prototyping and design prototype for solving problem CO4: Analyze emotional experience and Inspect emotional expressions to better understand users while designing innovative products									
Prerequisite										Hrs
UNIT I	**Basics of Design Thinking** 1.Understand the concept of innovation and its significance in business 2.Understanding creative thinking process and problem solving approaches 3.Know Design Thinking approach and its objective 4. Design Thinking and customer centricity – real world examples of customer challenges, use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product. 5. Discussion of a few global success stories like AirBnB, Apple, IDEO, Netflix etc. 6.Explain the four stages of Design Thinking Process – Empathize, Define, Ideate, Prototype, Implement									
UNIT II	**Learning to Empathize and Define the Problem** 1.Know the importance of empathy in innovation process – how can students develop empathy using design tools 2.Observing and assimilating information 3.Individual differences & Uniqueness Group Discussion and Activities to encourage the understanding, acceptance and appreciation of individual differences. 4.What are wicked problems 5.Identifying wicked problems around us and the potential impact of their solutions									
UNIT III	**Ideate, Prototype and Implement** 1.Know the various templates of ideation like brainstorming, systems thinking 2.Concept of brainstorming – how to reach consensus on wicked problems 3.Mapping customer experience for ideation 4.Know the methods of prototyping, purpose of rapid prototyping. 5.Implementation									
UNIT IV	**Feedback, Re-Design & Re-Create** 1.Feedback loop, focus on User Experience, address ergonomic challenges, user focused design 2.Final concept testing, 3.Final Presentation – Solving Problems through innovative design concepts & creativesolution									
TextBooks/ Reference Books	1.E Balaguruswamy (2023), Developing Thinking Skills (The way to Success), Khanna Book 2.Tim Brown, (2008), "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation", Harvard Business Review 3.8 steps to Innovation by R T Krishnan & V Dabholkar, Collins Publishing 4.Design Thinking and Innovation 5.Design Thinking by Nigel Cross, Bloomsbury									