MATS SCHOOL OF INFORMATION TECHNOLOGY

SYLLABUS

(Two Year Full-Time Post Graduate Course)

Master of Computer Applications
(MCA)

2025-27

(Semester Based Course)

Programme Outcomes:

No.	Programme Outcomes
PO1	Computational Knowledge: Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
PO2	Problem Analysis: Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
PO3	Design /Development of Solutions: Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex Computing problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern Tool Usage: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
PO6	Professional Ethics: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.
PO7	Life-long Learning: Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO8	Project management and finance: Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO9	Communication Efficacy: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
PO10	Societal and Environmental Concern: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.
PO11	Individual and Team Work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
PO12	Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

CURRICULUM

PROGRAM: MCA   SEMESTER: I

Course Code: MCA DSC-101-T	Credit: 04	Course: Object Oriented Programming Concepts	L: 03	T: 01	P: 00
Prerequisites:	Nil		
Objectives:	The objective of this course is to make student understand and implement concepts of object-oriented programming, which is in itself one of the most powerful programming languages, it aims to implement real-world entities like inheritance, hiding, polymorphism, etc. in programming.		
Course Outcome:	Upon successfully finishing the course, students will have the capability to:		

No.	Course Outcome	BT Level
CO1	Understand the basic building block of programming.	Understand
CO2	Apply the concept of class and object, memory allocation and deallocation concepts.	Understand Apply
CO3	Gain the understanding of operator overloading and will also apply inheritance using real world scenarios.	Apply Analysis
CO4	Implement the concept of pointer, need of friend function and one the most important feature polymorphism.	Understand Apply
CO5	Analyze the process of data storing and accessing through file stream classes.	Apply

Program Outcomes and Course Outcomes Mapping:	Course Outcomes	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1	✓		✓	✓	✓	✓	✓					
	CO2	✓	✓	✓		✓							
	CO3	✓				✓							
	CO4	✓				✓							
	CO5	✓	✓	✓	✓								

No.		Module Description	BT Level	Hours
1		**Programming Paradigms**	**U, AP**	**16**
	1.1	Programming Language Concepts	U	1
	1.2	Types Of Programming Language and Its Application Area	U	1
	1.3	Source File Creation, Compilation and Linking	U	1
	1.4	Features And Structure of C++ Program	U	1
	1.5	Data Types, Tokens: Keywords, Identifiers, Variables and Constants, Operators	U	4
	1.6	Control Statements: Branching, Looping and Jumping	U, AP	4
	1.7	Array Declaration and Initialization	U	1
	1.8	Access the Array Elements	U	1
	1.9	Types of Arrays	U, AP	2
2		**Class, Object, Constructor and Destructor**	**U, AP, AN**	**12**
	2.1	Object Oriented Programming Concepts, Advantage	U	1
	2.2	Object and Class	U,	1
	2.3	Member Function	U,	1
	2.4	Array within the Class	U, AP	1
	2.5	Memory Allocation of Objects	U, AP, AN	1
	2.6	Friend Function	U, AP	1
	2.7	Local Class	U, AP	1
	2.8	Constructors: Parameterized, Multiple, Default Argument	U, AP	2
	2.9	Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructor	U, AP	2
	2.10	Destructors	U, AP	1
3		**Operator Overloading and Inheritance**	**U, AP, AN**	**8**
	3.1	Operator Overloading: Unary and Binary	U, AP	1
	3.2	Overloading Binary Operators Using Friends	U, AP	1
	3.3	Rules of Overloading Operators, Type Conversion	U, AP	1
	3.4	Inheritance, Derived Classes	U, AP	1
	3.5	Inheritance: Single, Multilevel, Multiple, Hierarchical and Hybrid	U, AP, AN	2
	3.6	Virtual Base Classes, Abstract Class	U, AP, AN	1
	3.7	Constructors In Derived Classes, Member Classes	U, AP	1
4		**Pointer, Virtual Function and Polymorphism**	**U, AN**	**8**
	4.1	Pointers: Pointers To Objects, This Pointer	U, AN	1
	4.2	Pointer To Derived Classes	U, AN	1
	4.3	Virtual Function, Pure Virtual Function	U, AN	2
	4.4	Polymorphism: Compile Time, Run Time	U, AN	2
	4.5	Overloading and overriding	U, AN	2
5		**Console I/O Operations and File Handling**	**U, AP, AN**	**10**
	5.1	Stream Classes	U	1
	5.2	I/O Operations: Unformatted and Formatted	U	1
	5.3	Managing Output with Manipulators	U, AN	1
	5.4	Classes For File Stream Operations	U, AP	1

	5.5	Opening and Closing a File, Detecting End-of-File	U, AP	1
	5.6	File Modes, File Pointers and Their Manipulations	U, AP	2
	5.7	Sequential Input and Output Operations	U, AP	1
	5.8	Random Access File	U, AP, AN	1
	5.9	Error Handling During File Operations	U, AP, AN	1

Course Modules and Course Outcomes Mapping:	#	Module	Course Outcomes				
			CO1	CO2	CO3	CO4	CO5
	1	Programming Paradigms	✓	✓			✓
	2	Class, Object, Constructor and Destructor	✓	✓		✓	
	3	Operator Overloading and Inheritance	✓		✓		
	4	Pointer, Virtual Function and Polymorphism	✓			✓	
	5	Console I/O Operations and File Handling	✓				✓

Text Books/ Resources:	1. E. Balagurusamy , "Object Oriented Programming with C++", Tata McGraw-Hill: **TB#1**
Reference eBooks/ Resources	2. Herbert Schildt , "The Complete Reference" Tata McGraw-Hill 3. Robert Lafore , "Object Oriented Programming in Turbo C++" The Waite Group 4. Programming in Modern C++ NPTEL SWAYAM: https://onlinecourses.nptel.ac.in/noc23_cs78/preview 5. C++ Tutorial https://www.javatpoint.com/cpp-tutorial

SYLLABUS

PROGRAM: MCA   SEMESTER: I

Course Code: MCA DSC-102-T	Credit: 04	Course: Database Technologies	L: 03 | T: 01 | P: 00
Prerequisites:	Nil		
Objectives:	Familiarize students with the fundamental principles of database systems, process of designing relational database schemas, transaction processing. Introduce the concept of object-oriented databases and provide hands-on experience in SQL & procedural SQL programming.		

Course Outcome:	Upon successfully finishing the course, students will have the capability to:		
	No.	**Course Outcome**	**BT Level**
	CO1	Gain an understanding of database concepts, data models, database architecture, and user roles.	Understand
	CO2	Explore the process of designing efficient relational database schemas for applications.	Apply
	CO3	Demonstrate the application of conditional and iterative statements, and develop user-defined functions, stored procedures, and triggers using procedural SQL.	Apply
	CO4	Apply the concepts of transactions, understand their states, and grasp the concepts of concurrency and the necessity of serializability.	Apply
	CO5	Analyze the principles of Object-Oriented databases.	Analyze

Program Outcomes and Course Outcomes Mapping:	Course Outcom	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1
	CO1	√	√	√	√	√							
	CO2	√	√	√	√	√							
	CO3	√	√	√	√	√							
	CO4	√	√	√	√	√	√						
	CO5	√	√	√	√	√	√						

Syllabus				
No.		**Module Description**	**BT Level**	**Hours**
1		**Introduction to Database Management System**		**10**
	1.1	Purpose of Database Systems	Understand	2
	1.2	View of Data: Data Abstraction, Instances and Schemas	Understand	1
	1.3	Data Models: Relational Model, Entity-Relationship Model, Object-Based Data Model, Semistructured Data Model, Database Languages	Understand	3
	1.4	Data Storage and Querying, Database Architecture	Understand	2
	1.5	Database Users and Administrators	Understand	2
2		**Relational Data Modeling and Database Design**		**10**
	2.1	Relational Model Concepts, Super Key, Candidate Key and Primary Key	Analyze	2
	2.2	Constraints: Domain, Key, Entity and Referential Integrity constraints	Analyze	1
	2.3	E.F. Codd's Rule	Understand	2
	2.4	Functional dependency, Armstrong's Inference rules	Analyze	1
	2.5	Decomposition of Relations: Lossless Join and Dependency Preservation property	Analyze	2
	2.6	Normalization: First, Second, Third, BCNF, PJNF	Analyze	2

3		**SQL and Procedural SQL**		**8**
	3.1.	Conditional statements and Iterative statements	Apply	2
	3.2.	User-defined functions	Apply	2
	3.3.	Stored Procedures, Parameter types: IN, OUT and INOUT	Apply	2
	3.4.	Triggers: Introduction, Needs, Before trigger and After trigger	Apply	2
4		**Transaction management and Concurrency**		**12**
	4.1.	Transaction: Introduction, Transaction Model	Understand	2
	4.2.	Properties of Transactions	Understand	2
	4.3.	Transaction isolation, Schedules: Serial, Non-Serial Schedules	Understand	2
	4.4.	Serializability, Conflict Serializability	Understand	2
	4.5.	Concurrency Control	Understand	2
	4.6.	Concurrency Control Protocols: Lock based and Timestamp based	Understand	2
	4.7.	Deadlock Handling: Detection and Prevention	Understand	
5		**Object-Oriented Database**		**10**
	5.1.	Limitations of RDBMS	Understand	2
	5.2.	Introduction: OODBMS and ORDBMS	Understand	2
	5.3.	Storing and Accessing Objects in a Relational Database	Understand	2
	5.4.	Object-Oriented Database Design	Understand	2
	5.5.	Introduction to Object-Oriented Data Models	Understand	2

#	Module	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Database Management System	✓				
2	Relational Data Modeling and Database Design		✓			
3	Working with Procedural SQL			✓		
4	Transaction management and Concurrency control				✓	
5	Object-Oriented Database					✓

Course Modules and Course Outcomes Mapping:

Text Books/ Resources:
1. Henry F. Korth, "Database System Concepts", Tata McGraw Hills
2. Ivan Bayross, "MySQL 5.1 for Professionals", SPD

Reference Books/ Resources
1. Elmasri and Navathe, "Fundamentals of Database Systems", Pearson Education.
2. Thomas Connolly and Carolyn Begg, "Database Systems, A Practical Approach to Design Implementation and Management", Pearson Education
3. MySQL Reference Manual - https://dev.mysql.com/doc/refman/8.0/en/
4. PostgreSQL Reference Manual - https://www.postgresql.org/docs/

CURRICULUM

PROGRAM: MCA   SEMESTER: I

Course Code: MCA DSC-103-T	Credit: 04	Course: DATA STRUCTURE CONCEPTS	L: 03	T: 01	P: 00
Prerequisites:	Nil		

Objectives:	To provide the knowledge of basic data structures and their implementations. Also understand the importance of data structures in context of writing efficient programs and develop skills to apply appropriate data structures in problem solving.	
Course Outcome:	Upon successfully finishing the course, students will have the capability to:	

	No.	Course Outcome	Level
	CO1	Student gets able to understand and Implement linear and non-linear data structures.	Understanding, Apply
	CO2	Student gets ability to use structures such as stack, queues, linked list, trees and graphs.	Understanding Apply
	CO3	Exploring linked lists, including traversal, search, insertion, deletion, and memory handling.	Understanding Apply
	CO4	Student gets able to understand and Implement concept of tree and graph.	Understanding Apply
	CO5	Evaluate algorithms and data structures in terms of time and space complexity of basic operations.	Understanding Analysis Evaluation

Program Outcomes and Course Outcomes Mapping:	Course Outcom	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1
	CO1	√	√	√	√	√							
	CO2	√	√	√	√	√							
	CO3	√	√	√	√	√							
	CO4	√	√	√	√	√	√						
	CO5	√	√	√	√	√	√						

Curriculum				
No.	Module Description		BT Level	Hours
1	**Linear Data Structure**			10
	1.1	Data structure concepts, Data type, Abstract data type	Understand	2
	1.2	Linear data structures using sequential organization, Operations	Understand, Apply	2
	1.3	Linear Array in data structure and its classification, Properties and representation of an array, Operation and Memory location	Understand, Apply	2
	1.4	Searching Algorithms: Linear, Binary	Apply, Analyze	2
	1.5	Sorting Algorithm—Insertion, Selection, Merge sort	Apply, Analyze	2
2	**Stack, Queue and Recursion**			12

	2.1	Representation of Stacks using sequential organization, Applications	Understand, Apply	4
	2.2	Recursion and its applications	Apply, Analyze	4
	2.3	Queue, Representation of Queues using sequential organization, Dequeue, Priority Queue	Understand, Apply	4
3	**Linked List**			**08**
	3.1	Linked list and its representation	Understand	2
	3.2	Operations on Linked list: Traversing, Searching, Insertion, Deletion	Understand, Apply	4
	3.3	Memory Allocation	Understand, Apply	2
4	**Tree and Graph**			**10**
	4.1	Tree concepts	Understand	1
	4.2	Binary Tree-Representation	Understand	1
	4.3	Operations: Searching, Insertion, Deletion	Understand, Apply	2
	4.4	Algorithms: Binary Search Tree and AVL	Understand, Apply	3
	4.5	Graph, Graph Representation, Operations: Searching, Insertion, Deletion, Traversing	Understand, Apply	3
5	**Algorithm Analysis and Design**			**10**
	5.1	The Role of Algorithm in Computing, Characteristics of algorithm, P and NP problem	Understand, Analyze	2
	5.2	Analyzing algorithms: Time and space complexity, Execution time	Analyze, Evaluate	2
	5.3	Asymptotic notations	Analyze, Evaluate	2
	5.4	Algorithm design techniques: • Greedy algorithm • Divide and conquer • Dynamic programming And it's implementation.	Analyze, Evaluate	4

#	Module	CourseOutcomes				
		CO1	CO2	CO3	CO4	CO5
1	Linear Data Structure	√	√	√	√	√
2	Stack, Queue and Recursion	√	√			
3	Linked List	√	√	√		
4	Tree and Graph	√			√	
5	Algorithm Analysis and Design					√

Text Books/ Resources:

3. Seymour Lipschutz, "Data Structures", McGraw Hill Education**: TB#1**

4. Alfred V. Aho, John E. Hopcroft, Jeffry D. Ullaman" Data Structure and Algorithms", Pearson Education: **TB#2**

5. Thomas H Coreman , "Introduction to algorithms", MIT Press: **TB#3**

Reference Books/ Resources

5. Michael T. Goodrich, Roberto Tamassia, David M. Mount, "Data Structure and Algorithm", John Wiley & Sons

6. G.S. Baluja, "Data Structures Through C++"

CURRICULUM

PROGRAM: MCA   SEMESTER: I

Course Code: MCA DSC-104	Credit: 04	Course: Mathematical Foundation of Computer Application	L: 03 | T: 01 | P: 00
Prerequisites:	Nil		
Objectives:	Familiarize students with the fundamental principles of set theory, function. Introduce the concept of logical connectivities, basic concept of Boolean algebra. Acquire knowledge on lattice and coding theory. Understand group theory and basic concepts of graph theory.		

Course Outcome:	Upon successfully finishing the course, students will have the capability to:		
	No.	**Course Outcome**	**BT Level**
	CO1	Understand sets and of relations, Identify different types relations, functions, compute composition and inverse of a function.	Understand, Apply, Analyse
	CO2	Gain knowledge on lattice and coding theory.	Understand, Apply
	CO3	Gain knowledge on logical connectivities, basic concept of Boolean algebra and its application in logic building.	Understand, Apply, Analyse
	CO4	Able to define and explain the basic concepts of graph theory and its applications.	Understand, Apply, Analyse
	CO5	Describe and understand group theory which is crucial ingredients in computer science	Understand, Apply

Program Outcomes and Course Outcomes Mapping:	Course Outcomes	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1	✓	✓	✓	✓			✓					
	CO2	✓	✓	✓	✓			✓					
	CO3	✓	✓	✓	✓			✓					
	CO4	✓	✓	✓	✓			✓					
	CO5	✓	✓	✓	✓			✓					

Curriculum				
No.	Module Description		BT Level	Hours
1	Set Theory, Mathematical Logic, Relation and Function		U, AP, AN	10
	1.1	Introduction to Set theory, Cartesian Product	U	2
	1.2	Statements and Notations, Logical Connectives	U, AP	2
	1.3	Tautology, Contradiction, Logical equivalence	U, AP	2
	1.4	Relation, Types of Binary relation, Equivalence relation	U, AP	2
	1.5	Function, Properties of function, Composition of Functions	U, AP, AN	2
2	POSETS and Lattices		U, AP	10
	2.1	Introduction, Partial order relation	U	2
	2.2	Partial ordered set, HASSE diagram	U, AP	3
	2.3.	Lattice, Sub-Lattices, Well ordered set, Complete lattice	U, AP	3
	2.4	Distributive and Complemented lattice	U	2
3	Boolean Algebra		U, AP, AN	10

	3.1	Basic concepts of Boolean Algebra, Boolean lattice, Boolean algebra	U	2
	3.2	Boolean functions, Disjunctive and Conjunctive normal form, Complement function, Bool's Expansion theorem	U, AP	3
	3.3	Karnaugh map method for simplification of Boolean expressions	U, AP, AN	3
	3.4	Applications of Boolean Algebra in switching circuits, logic circuits	U, AP, AN	2
4	**Graph Theory**		**U, AP, AN**	**12**
	4.1	Basic concepts of graph theory	U	2
	4.2	Subgraph, Walk, Paths and Circuits	U	2
	4.3	Types of graphs	U	3
	4.4	Matrix Representation of Graphs, Directed Graphs	U,AP	2
	4.5	Tree and its properties, Rooted Tree, Binary Trees, Spanning tree, Fundamental Circuits	U, AP, AN	3
5	**Semi Group and Monoids**		**U, AP**	**8**
	5.1	Algebraic structure, Binary operation, Properties, Semi group, Monoid, Group theory,	U	2
	5.2	Abelian group, Cyclic group, Generators, Permutation group, Subgroup,	U, AP	2
	5.3	Homomorphism, Isomorphism and Automorphism.	U, AP	2
	5.4	Cosets, Langranges Theorem, Normal Subgroup and Quotient group	U, AP	2

Course Modules and Course Outcomes Mapping:	#	Module	CourseOutcomes				
			CO1	CO2	CO3	CO4	CO5
	1	Set Theory, Mathematical Logic, Relation and Function	✓	✓			
	2	POSETS and Lattices	✓	✓			
	3	Boolean Algebra	✓		✓		
	4	Graph Theory	✓			✓	
	5	Semi Group and Monoids	✓				✓

Text Books/ Resources:	1. H.K Pathak, J.P. Chauhan "Advanced Discrete Mathematics", Shree Shiksha Sahitya Prakashan 2. Swapan Kumar Sarkar, "Discrete Mathematics", S. Chand & Company Ltd.

Reference Books/ Resources	1. Ralph, Gimaldi, Discrete and Combinatorial Mathematics, Pearson Education.
	2. N.Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice Hall.
	3. H.K Pathak, Discrete Mathematics
	4. Kolman, B, Busby, R.C.Ross, S.C. Discrete Mathematical Structures, Pearson Education.
	5. Liu, C.L. Elements of Discrete Mathematics, Tata McGraw Hill.

SYLLABUS
PROGRAM: MCA   SEMESTER: II

Course Code: MCA DSC-201-T	Credit: 03	Course: Advanced JAVA Programming	L: 02	T: 01	P: 00
Prerequisites:	Nil		
Objectives:	This course aims to equip students with a comprehensive understanding of Java programming and related technologies. By the end of the course, students will achieve proficiency in Object-Oriented Programming (OOP) concepts, including class, object, encapsulation, polymorphism, inheritance, and abstraction. They will learn package management, error handling, multithreading, network programming, and Java Database Connectivity (JDBC). Additionally, the course covers Java FX for graphical user interface development, Servlet technology for web applications, and JSP technology for dynamic web content. Students will gain expertise in Spring and Spring Boot frameworks, including dependency injection, web application development, data handling with JDBC, and Aspect-Oriented Programming (AOP). Overall, the course aims to prepare students to apply these skills in practical scenarios and stay current in the dynamic field of Java development.		
Course Outcome:	Upon successfully finishing the program, students shall be able to: Develop Business Logic, Develop GUI & Web Application		

	No.	Course Outcome	BT Level
	CO1	Student will understand the basic building block of core Java programming.	Understand, Apply, Analyze
	CO2	Students should gain a comprehensive understanding of Java FX and its various features, enabling them to create interactive and visually appealing graphical user interfaces.	Understand, Apply, Analyze

C O3	Students should gain a solid understanding of J2EE concepts and be able to develop Servlets that handle client requests, manage form data, handle cookies, and implement session tracking in web applications.	Understand, Apply, Analyze
C O4	Students should gain a comprehensive understanding of JSP concepts and be able to develop dynamic web pages	Understand, Apply,

		using scripting elements, implicit objects, directive elements, and action elements.	Analyze
	CO5	Students should gain a comprehensive understanding of Spring and Spring Boot concepts and be able to develop applications using these frameworks.	Understand, Apply, Analyze

Program Outcomes and Course Outcomes Mapping :	Course Outcomes	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1	√		√	√		√	√					
	CO2	√			√								
	CO3	√			√		√						
	CO4	√		√	√								
	CO5	√		√	√								

No.		Module Description	BT Level	Hours
1		**Object Oriented Programming Concepts and Implementations**	**U, AP**	**12**
	1.1	OOPS Concepts and implementation: Class, Object, Encapsulation, Polymorphism, Inheritance, Abstraction	U, AP	2

	1.2	Package Concepts and Implementation: Defining and use of package	U, AP	2
	1.3	Managing Errors and Exceptions	U, AP	2
	1.4	Multithreading: Concepts, Life Cycle, Methods	U, AP	2
	1.5	Network Programming: Introduction, Classes and its methods	U, AP	2
	1.6	Java Database Connectivity: Architecture, Drivers, Connectivity with database	U, AP	2
2	**JAVA FX Technology**		**U, AP**	**10**
	1.1	Introduction to Java FX, Features, Architecture & Application	U	1
	1.2	Java 2D Shapes, Colors, Text	U, AP	1
	1.3	Java FX Effects	U, AP	1
	1.4	Java FX Transformation	U, AP	1
	1.5	Java FX Animation	U, AP	1
	1.6	Java FX 3D Shapes	U, AP	1
	1.7	Java FX Layout	U, AP	1
	1.8	Java FX UI Controls	U, AP	1
	1.9	Java FX Images	U, AP	1
	1.10	Java FX Event Handling	U, AP	1
3	**Servlet Technology**		**U, AP**	**10**
	3.1	J2EE Introduction and Architecture	U	1
	3.2	Java Servlet: Basic Servlet Structure	U	2
	3.3	Servlet Life Cycle	U	1
	3.4	Reading Form Data from Servlet	U, AP	1
	3.5	Handlin the Client Request, Generating the Server Response	U, AP	1
	3.6	Handling Cookies: Benefit of Cookies, Deleting Cookies, Sending and Receiving Cookies, Cookies Attributes	U, AP	2
	3.7	Session Tracking: Need of Session Tracking, Session Tracking Basics, Session Tracking API,	U, AP	2
4	**JSP Technology**		**U, AP**	**8**
	4.1	Introduction, Need and Benefit of JSP, Life Cycle of JSP	U	1
	4.2	JSP Scripting Elements : Scriptlet tag, Expression Tag, Declaration	U, AP	2

		Tag		
	4.3	Implicit Object: Request, Response, Config, Application, Session, Page Context, Page, Exception	U, AP	2
	4.4	Directive Elements: Page directive, include directive, taglib directive	U, AP	2
	4.5	Action Elements: forward, include	U, AP	1
5	**Spring and Spring Boot Framework**		**U, AP**	**14**
	5.1	Introduction to Spring Initializing and Writing Spring application	U, AP	1
	5.2	Dependency Injection: IOC Container, Dependency Injection, Constructor Injection.	U, AP	2
	5.3	Developing web applications: Displaying & processing information, Validating Form Input, Working with View Controller	U, AP	2
	5.4	Working with Data: Reading and Writing data with JDBC, Working with Spring data JDBC	U, AP	2
	5.5	Introduction to Spring Boot, Difference between Spring and Spring Boot, Spring Boot Architecture	U	1
	5.6	Project Component: Annotations, Dependency Management, Application Properties,	U, AP	2
	5.7	Developing Spring Boot Applications: Putting spring boot to work, using starter dependencies, using automatic configurations	U, AP	2
	5.8	AOP (Aspect Oriented Programming) : Before, After, Around, Returning, Throwing	U, AP	2

Course Modules and Course Outcomes Mapping:	#	Module	Course Outcomes				
			CO 1	CO 2	CO 3	CO 4	C O5
	1	Object Oriented Programming Concepts and Implementations	√				
	2	JAVA FX Technology		√			
	3	Servlet Technology			√		
	4	JSP Technology				√	
	5	Spring and Spring Boot Framework					√

Text Books/ Resources:	1. E. Balagurusamy , "Programming with Java", Tata McGraw-Hill: TB#1 2. Marty Hall, Larry Brown, "Core Servlet and JavaServer Pages", PEARSON: TB#2 3. Carl Dea, Mark Heckler, Gerrit Grunwald, Jose Pereda Ph.D, Sean M Philips, "Java FX 8 Introduction by Example", Apress: TB#3 4. Craig Walls, "Spring IN ACTION",MANNING: TB#4 5. Craig Walls, Andrew Glover, "Spring Boot IN ACTION",MANNING: TB#5
Reference Books/ Resources	1. Bruce Eckel, "THINKING IN JAVA", PEARSON 2. JDK Release Notes - https://www.oracle.com/java/technologies/javase/jdk-relnotes- index.html 3. JavaFX - https://jenkov.com/tutorials/javafx/index.html

SYLLABUS

PROGRAM: MCA   SEMESTER: II

Course Code: MCA DSC-202-T	Credit: 03	Course: Operating System Concepts and Shell Programming	L: 02	T: 01	P: 00
Prerequisites:	Nil		

Objectives:	To provide a basic understanding of the operating system's function, architecture, services, and interservice coordination. To learn the fundamentals of creating, running, and troubleshooting shell scripts. Discuss the fundamental control structures, variables, and data kinds that are needed to build scripts.	
Course Outcome:	Upon successfully finishing the course, students will have the capability to:	

	No.	Course Outcome	BT Level
	CO1	Understanding the concept and Types of Operating Systems, Structure and Functions of OS, and Basics of System software's.	Understand
	CO2	Understand the various process states and their transitions, and context switching in managing processes. Demonstrate the different CPU scheduling methods and Concurrency control.	Analysis
	CO3	Determine and understand the concept of memory management, swapping, paging, segmentation, virtual memory management and page replacement algorithms.	Understand
	CO4	Understand the disk architecture, various disk scheduling algorithms, file systems implement, access method selection, and file allocation methods.	Understand
	CO5	Analyze the various features and functionalities of different shells in shell programming, including control flow statements , functions, and file handling mechanism.	Analyze
Program Outcome:	Upon successfully finishing the program, students shall be able to:	

Program Outcomes and Course Outcomes Mapping:	Course Outcomes	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1	√		√									
	CO2	√	√	√									
	CO3	√		√		√							
	CO4	√	√			√	√						
	CO5	√		√		√							

No.	Module Description		BT Level	Hours
1	**Introduction to Operating System**			10
	1.1	Introduction to Operating System.	Understand	2
	1.2	Need and Functions of Operating Systems	Understand	2
	1.3	Computer System Operations	Understand	3
	1.4	Types of OS -Batch processing, Multi-programming, Time sharing	Understand	2
	1.5	Operating-System Services	Understand	2
	1.6	System Calls.	Understand	2
	1.7	Operating-System Structure	Understand	2
	1.8	Design Goals	Understand	2
2	**Process Management and Synchronization**			10
	2.1	Process Concepts	Understand	2
	2.2	Process State	Understand	1
	2.3	Process Control Block	Understand	2
	2.4	Operations on Processes	Understand	1
	2.5	Inter process communications	Understand	1

	2.6	Process Scheduling	Understand	2
	2.7	CPU Scheduling algorithms	Apply	3
	2.8	Process Threads – Overview	Understand	1
	2.9	Critical Section problem	Understand	2
	2.10	Semaphores.	Understand	3
	2.11	Classical problems of synchronization	Understand	2
	2.12	Deadlock Characterization	Understand	2
	2.13	Deadlock Handling: Avoidance, Detection &Prevention	Apply	3
3	**Storage Management**			**8**
	3.1.	Contiguous Memory Allocation	Understand	2
	3.2.	Paging Techniques: Swapping, Paging, Segmentation, Fragmentation	Apply	3
	3.3.	Demand Paging.	Understand	1
	3.4.	Page Replacement : Page Replacement Algorithm	Apply	3
	3.5.	Virtual Memory.	Understand	2
	3.6.	File Concepts, Access Methods	Understand	2
	3.7.	File Systems Structures	Understand	2
	3.8.	File System Implementation	Understand	2
	3.9.	Free Space Management	Understand	2
4	**Disk Scheduling and Distributed Systems**			**12**
	4.1.	I/O Hardware	Understand	2
	4.2.	Application of I/O Interface	Understand	3
	4.3.	Disk Structures	Understand	1
	4.4.	Disk Scheduling Algorithms	Apply	2
	4.5.	Disk Management	Understand	1
	4.6.	RAID Structure	Understand	2
	4.7.	Distributed System Structure	Understand	2
	4.8.	Distributed File Systems	Understand	2
	4.9.	Naming and Transparency	Understand	2

	4.10.	Remote File Accesses	Understand	2
	4.11.	Stateful Versus Stateless Service	Understand	2
5		**Shell Programming**		**10**
	5.1.	Introduction to shell programming	Understand	2
	5.2.	Various types of Shells and their Comparisons	Understand	2
	5.3.	Command Execution	Apply	3
	5.4.	Command Execution Process	Apply	3
	5.5.	Shell programming in different shells	Apply	2
	5.6.	Decision Making Selections	Apply	2
	5.7.	Concept of Function , Parameter passing and argument	Apply	2
	5.8.	Filters.	Apply	2

Course Modules and Course Outcomes Mapping:	#	Module	Course Outcomes				
			CO1	CO2	CO3	CO4	CO 5
	1	Operating System Basic Concepts-Overview	√				
	2	Process Management and Process Synchronization		√			
	3	Memory Management			√		
	4	File Systems and I/O Management				√	
	5	Basic of Shell Programming					

Textbooks/ Resources:	1. Abraham Silberschatz, Peter B Galvin, and Gerg Gagne – "Operating System Concepts", Wiley. 2. Behrouz A. Forouzan and Richard F. Gilberg – "UNIX and Shell Programming".
Reference Books / Resources	1. Tanenbaum A - Modern Operating Systems - Pearson Education. 2. Dhamdhere D. M. – "Operating Systems", Tata McGraw Hill. 3. Sumitabha Das – "UNIX Concepts and Applications", Tata McGraw Hill. 4. Halder S. and Aravind A. – "Operating Systems", Pearson.

SYLLABUS

PROGRAM: MCA   SEMESTER: II

Course Code: MCA DSE-205	Credit: 03	Course: Advanced Networking Concepts	L: 02 | T: 01 | P: 00
Prerequisites:	Basic Database Management Concepts		
Objectives:	To understand the concepts and use of data communication and Networking, Goals and applications of networks, OSI and TCP/IP model, function of different layers of model, protocols, basic concept of network security etc.		
Course Outcome:	Upon successfully finishing the course, students will have the capability to:		

	No.	Course Outcome	BT Level
	CO1	Students are able to understand the basic concepts, services and role of each layer of OSI model and TCP/IP, transmission media ad multiplexing techniques.	Understand
	CO2	Students get proficiency to the functions of Data link Layer i.e. flow control, error control, error detection, error correction, noiseless and noisy channel etc.	Analyze, Apply
	CO3	Students get proficiency to the functions of Network Layer i.e. IPv4 and IPv6 addressing, subnetting etc.	Apply
	CO4	Students get proficiency to the functions of transport layer and Application Layer.	Apply
	CO5	Students are able to understand the basic concepts of Network Security and Cryptography.	Apply
Program Outcome:	Upon successfully finishing the program, students shall be able to:		

Program Outcomes and Course Outcomes Mapping:	Course Outcom	Program Outcomes										
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
	CO1	√	√	√	√							
	CO2	√	√	√	√							
	CO3	√	√	√	√							
	CO4	√	√	√	√							
	CO5	√	√	√	√							

No.	Module Description		BT Level	Hours
1	**Introduction to Networking and Physical layer**			10
	1.1	Data Communication: Components like Sender, receiver, protocols etc.	Understand	1
	1.2	Network Models: OSI and TCP/IP , Protocol	Analyze	2
	1.3	Addressing : Physical, Logical, Port	Analyze	2
	1.4	Transmission Media: Wired media, Wireless media	Understand	2
	1.5	Multiplexing Techniques; Frequency Division, Time Division, Synchronous time- division, Statistical Time Division	Analyze	3
2	**Data link layer**			11
	2.1	Type of error, redundancy, detection and correction	Understand	2
	2.2	Block Coding: Error Detection, Error correction , hamming distance	Analyze	2
	2.3	Cyclic code redundancy and checksum	Analyze	2
	2.4	Flow control and error control	Understand	2
	2.5	Noiseless and Noisy channels	Understand	3
3	**Network layer**			10
	3.1	Logical addressing : IPv4 addressing, IPv6 Addressing	Analyze	3
	3.2	IPv4: Datagram, Fragments, Checksum	Analyze	3
	3.3	IPv6: Advantages, Packet Format, Extension	Analyze	2

	3.4	Address Mapping, ICMP,IGMP	Understand	2
4		**Transport layer and Application layer**		**11**
	4.1.	Process To Process Delivery	Understand	2
	4.2.	TCP and UDP Protocol	Understand	2
	4.3.	Name Space, Domain Name Space	Understand	2
	4.4.	DNS, Resolution	Understand	2
	4.5	Application layer protocols: SMTP, FTP, POP, IMAP	Understand	3
5		**Network Security and Cryptography**		**08**
	5.1	Introduction to security services	Understand	2
	5.2	Digital signature	Understand	2
	5.3	Introduction to cryptography: Types	Understand	2
	5.4	IP Security	Understand	2

Text Books/ Resources:	1. Forouzan B., "Data Communication and Networking", 4rd Edition, McGraw-Hill :**TB#1**
	2. Andrew S. Tanenbaum, "Computer Networks" , 5th Edition, Person Publication : **TB#2**
Reference Books/ Resource	1. James Kurose, Keith Ross, "Computer Networking: A Top-Down Approach", 7th Edition, Pearson Publication.
	2. Russ White, Ethan Banks, "Computer Networking Problems and Solutions ", 1st Edition, Cisco Press.
	3. https://www.javatpoint.com/computer-network-tutorial
	4. https://www.geeksforgeeks.org/computer-network-tutorials/

SYLLABUS

PROGRAM: MCA   SEMESTER: II

Course Code: ODL MCA206	Credit: 03	Course: Data Warehousing and Data Mining	L: 02	T: 01	P: 00
Prerequisites:	Basic Database Management Concepts		
Objectives:	To understand the need for analysis of large datasets, data mining models and methods to discover interesting patterns from such dataset. To understand the need for analysis of large dataset, multidimensional data modelling, OLAP and various data mining techniques.		
Course Outcome:	Upon successfully finishing the course, students will have the capability to:		

	No.	Course Outcome	BT Level
	CO1	Appreciate the multidisciplinary field of data mining, its need and the importance.	Understand
	CO2	Apply various pre-processing techniques on the data before mining.	Analyze, Apply
	CO3	Understand, design and create a data warehouse and perform OLAP operations on it.	Apply
	CO4	Appreciate and apply the concept of association rule mining.	Apply
	CO5	Appreciate and apply the concept of classification and clustering.	Apply

Program Outcomes and Course Outcomes Mapping:	Course Outcom	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1
	CO1	√	√	√	√	√							
	CO2	√	√	√	√	√							
	CO3	√	√	√	√	√							
	CO4	√	√	√	√	√	√						
	CO5	√	√	√	√	√	√						

No.		Module Description	BT Level	Hours
1		**Introduction to Data Mining**		8
	1.1	Introduction to Data Science: Data mining, Machine Learning, Deep Learning, Artificial Intelligence, Data Warehouse, Big Data	Understand	2
	1.2	Data Mining, Knowledge Discovery from Data (KDD) Framework	Understand	2
	1.3	Types of data for Data Mining	Understand	1
	1.4	Data Mining: Confluence of multiple disciplines	Understand	1
	1.5	Data Mining Applications	Understand	2
2		**Data Preprocessing**		10
	2.1	Data types: Nominal attributes, Binary attributes, Ordinal attributes	Understand	2
	2.2	Statistics of data: Central tendency, dispersion of data - Range, quartiles, Variance and standard deviation	Understand	2
	2.3	Covariance and correlation analysis	Understand	2
	2.4	Data quality, Data cleaning: Missing values, Noisy data, Data integration	Understand	2
	2.5	Data transformation: Normalization, Discretization	Understand	2
3		**Data warehousing and Online Analytical Processing**		10
	3.1	Introduction to Data Warehouse	Analyze	1

	3.2	Data Warehouses Architecture: The three-tier architecture, ETL, Enterprise data warehouse and data mart	Analyze	2
	3.3	Data cube: a multidimensional data model	Understand	2
	3.4	Schemas for multidimensional data models: stars, snowflakes, and fact constellations	Analyze	2
	3.5	Concept hierarchies	Analyze	1
	3.6	OLAP operations	Analyze	2
4	**Association Rule Mining**			**10**
	4.1.	Market basket analysis	Apply	2
	4.2.	Frequent itemset	Apply	2
	4.3.	Apriori algorithm: finding frequent itemset	Apply	2
	4.4.	Generating association rules from frequent itemset	Apply	2
	4.5	From association analysis to correlation analysis		2
5	**Classification and Cluster Analysis**			**12**
	5.1	Introduction to Classification	Understand	1
	5.2	Decision tree induction	Understand	2
	5.3	Attribute selection measures: Information gain, Gain ratio	Understand	2
	5.4	Naïve Bayesian classification	Understand	2
	5.5	Cluster Analysis	Understand	1
	5.6	Partitioning methods	Understand	2
	5.7	k-Means: a centroid-based technique	Understand	2

Course Modules and Course Outcomes Mapping:	#	Module	Course Outcomes				
			CO1	CO2	CO3	CO4	CO5
	1	Introduction to Data Mining	√				
	2	Data Preprocessing		√			
	3	Data warehousing and Online Analytical Processing			√		
	4	Association Rule Mining				√	
	5	Classification and Cluster Analysis					√

Text Books/ Resources:	1. Han, J. and Kamber, M. - Data Mining: Concepts & Techniques, 3rd Edition - Morgan Kaufmann Publishers: TB#1 2. Ian H. Witten, Eibe Frank, Mark A. Hall, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann Publications
Reference Books/ Resource	1. Mohammed J. Zaki Wagner Meira Jr - Data Mining and Machine Learning: Fundamental Concepts and Algorithms 2. Pujari, A. - Data Mining techniques - Universities Press 3. Pudi, V. and Radhakrishnan, P. - Data Mining - Oxford University Press 4. Larose, D. - Data Mining Methods & Models - Wiley-India 5. Berry, M. and Linoff, G. - Data Mining Techniques - Wiley-India

<table>
<tr><td colspan="4" align="center">**SYLLABUS**
PROGRAM: MCA   SEMESTER: III</td></tr>
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Course Code: ODL MCA301	Credit: 04	Course: Software Project Management	L: 03 | T:01 | P:00
Prerequisites:	Nil		
Objectives:	Equip them with essential skills in planning, executing, and managing software projects. It focuses on understanding project management fundamentals, developing planning skills, and using tools for effective project control and risk management.		
Course Outcome:	Upon successfully finishing the course, students will have the capability to:		

	No.	Course Outcome	BT Level
	CO1	Students will master project planning, scheduling, and estimation techniques, including using various project management tools and addressing common planning and estimation issues.	Understanding, Applying, Analyzing, Evaluating
	CO2	Students will develop skills in eliciting, specifying, and managing software requirements, using use cases, and handling changes and issues effectively.	Applying, Analyzing, Evaluating
	CO3	Students will understand the SDLC phases and various models such as Waterfall, Agile, and Spiral, applying them to manage and execute software projects effectively.	Understanding, Applying, Analyzing, Evaluating
	CO4	Students will gain proficiency in design reviews, refactoring, unit testing, and automation, while also learning to diagnose design and programming problems and manage software testing processes.	Understanding, Applying
	CO5	Students will learn to create and execute test plans, track defects, and apply process improvement strategies, while understanding the challenges of change management and enhancing software testing practices.	Understanding, Applying, Analyzing, Evaluating

Program Outcomes and Course Outcomes Mapping:	Course Outcomes	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1	√				√		√					
	CO2	√				√		√					
	CO3	√			√	√		√					
	CO4	√			√	√		√					
	CO5	√				√		√					

No.	Module Description		BT Level	Hours
1	**Fundamentals of Software Project Planning and Estimation**		Understanding, Applying, Analyzing, Evaluating	11
	1.1	Introduction	Understanding	1
	1.2	Tools and Techniques	Applying	1
	1.3	Software Project Planning	Analyzing	1
	1.4	Understand the Project Need	Understanding	1
	1.5	Create the Project Plan	Applying	1
	1.6	Diagnosing Project Planning Problems	Evaluating	1
	1.7	Project Estimation	Analyzing	1
	1.8	Element of Successful Estimate	Analyzing	1
	1.9	Wideband Delphi Estimation	Applying	1
	1.10	Other Estimation Techniques	Applying	1
	1.11	Diagnosing Estimation Problems	Evaluating	1
2	**Advanced Project Scheduling and Quality Assurance Techniques**		Applying, Analyzing, Evaluating	10

	2.1	Project Schedule	Applying	1
	2.2	Building the Project Schedules	Applying	1
	2.3	Managing Multiple Projects	Analyzing	1
	2.4	Use the Schedule to Manage Commitments	Analyzing	1
	2.5	Diagnosing Scheduling Problems	Evaluating	1
	2.6	Review, Ispections	Applying	1
	2.7	Deskchecks, Walkthrough	Applying	1
	2.8	Code Reviews, Pair Programming	Applying	1
	2.9	Use Inspections to Manage Commitments	Analyzing	1
	2.10	Diagnosing Review Problems	Evaluating	1
3		**Comprehensive Software Requirements Management**	**Understanding, Applying, Analyzing**	7
	3.1	Software Requirements	Understanding	1
	3.2	Requirement Elicitation	Applying	1
	3.3	Use Case	Applying	1
	3.4	Software Requirements Specification	Analyzing	1
	3.5	Change Control	Analyzing	1
	3.6	Introduce Software Requirements Carefully	Applying	1
	3.7	Diagnosing Software Requirement Problems	Evaluating	1
4		**Overview of Software Development Life Cycle (SDLC) Models**	**Understanding, Applying**	6
	4.1	Software Development File Cycle: Introduction, Software Process	Understanding	1
	4.2	SDLC Life Cycle, Need of SDLC,	Understanding	1
	4.3	SDLC Models	Applying	1
	4.4	Waterfall Model, RAD Model, Spiral Model	Applying	1
	4.5	V-Model, Incremental Model, Agile Model	Applying	1
	4.6	Iterative Model, Big-Bang Model, Prototype Model	Applying	1
5		**Advanced Software Design, Testing, and Process Improvement**	**Understanding, Applying, Analyzing, Evaluating,**	13

5.1	Design and Programming	Analyzing	1
5.2	Review the Design, Vision Control with Subversion	Applying	1
5.3	Refactoring, Unit Testing, Use Automation, Be Careful WITh Existing Projects	Evaluating	1
5.4	Diagnosing Design and Programming Problems	Evaluating	1
5.5	Software Tesing: Test Plan and Test Case, Test Execution	Applying	1
5.6	Defet Tracking and Triage	Analyzing	1
5.7	Test Environment and Performance Testing	Analyzing	1
5.8	Smoke Test, Test Automation, Postmortem Reports	Applying	1
5.9	Using Software Testing Effectively	Analyzing	1
5.10	Diagnosing Software Testing Problem	Evaluating	1
5.11	Understanding Change: Why Change Fails, How make Change Succeed	Understanding	1
5.12	Process Improvement: Life without a Software Process, Software Process Improvement	Analyzing	1
5.13	Moving Forward	Creating	1

Course Modules and Course Outcomes Mapping:		#	Module	Course Outcomes				
				CO1	CO2	CO3	CO4	CO5
		1	Fundamentals of Software Project Planning and Estimation	√				
		2	Advanced Project Scheduling and Quality Assurance Techniques		√			
		3	Comprehensive Software Requirements Management			√		
		4	Advanced Software Design, Testing, and Process Improvement				√	
		5	Advanced Software Design, Testing, and Process Improvement					√

Textbooks/ Resources:	1. Andrew Stellman and Jennifer Greene, "Applied Software Project Management", O'REILLY: #TB1
	2. https://www.javatpoint.com/software-engineering-software-development-life-cycle
Reference Books /Resources	1. Jack T. Marchewka, "Information Technology Project Management", WILEY
	2. Bob Hughes and Mike Cotterell, "Software Project Management", McGraw Hill

SYLLABUS

PROGRAM: MCA   SEMESTER: III

Course Code: MCA DSE 303-T	Credit: 04	Course: Machine Learning	L: 03 | T: 01 | P: 00
Prerequisites :	Nil		
Objectives:	The course objectives of a machine learning (ML) are to Gain a solid understanding of fundamental concepts in machine learning, including supervised learning, unsupervised learning, and reinforcement learning. Learn various machine learning algorithms and models, such as linear regression, decision trees, support vector machines, neural networks, clustering algorithms, and ensemble methods.		
Course Outcome:	Upon successfully finishing the course, students will have the capability to:		

	No	Course Outcome	BT Level
	CO	Understand the definitions and fundamental terms used in machine learning, as well as the differences between supervised, unsupervised, and reinforcement learning.	Understand
	CO	Gain proficiency in regression and implement various types of regression techniques.	Analysis
	CO	Understand Classification and implement various classification techniques like SVM, Naïve Bayes, K-NN etc.	Analysis
	CO	Understand unsupervised learning and implement various algorithm.	Understand
	CO	Apply machine learning techniques (NLP) to perform tasks such as text analysis and image recognition.	Apply

Program Outcomes and Course Outcomes Mapping:	Course Outcomes	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1					√			√				
	CO2	√	√		√	√			√				
	CO3	√	√		√	√			√				
	CO4	√	√		√	√			√				
	CO5	√	√		√	√			√				

Curriculum				
No.	**Module Description**		**BT Level**	**Hours**
1	**Introduction to Machine Learning Techniques**			10
	1.1	Introduction and Future Scope of Machine Learning	Understand	1
	1.2	Techniques of Machine Learning	Understand	2
	1.3	Application of Machine Learning	Understand, Analyse	2
	1.4	Types of data in Machine Learning	Understand	2
	1.5	Data Preprocessing Techniques	Understand, Analyse	1
	1.6	Continues and discrete data Dimensionality Reduction	Understand	2
2	**Regression**			10
	2.1	Introduction to Regression	Understand	1
	2.2	Types of Regression model	Understand	1
	2.3	Simple Linear Regression	Understand	1
	2.4	Multiple Linear Regression	Understand	1
	2.5	Polynomial Regression	Understand	1

	2.6	Decision Tree Regression	Understand	1
	2.7	Random Forest Regression	Understand	1
	2.8	Model Building using Least squares	Understand, Analyse	2
	2.9	Model Accuracy & Selection	Understand, Analyse	1
3	**Classification**			**11**
	3.1	Introduction to Classification	Understand	1
	3.2	Logistic Regression	Understand	2
	3.3	K-Nearest Neighbors (K-NN)	Understand	2
	3.4	Support Vector Machine (SVM)	Understand	2
	3.5	Naive Bayes	Understand	2
	3.6	Ensemble Methods	Understand, Analyse	2
4	**Unsupervised Learning & Association Rule Mining**			**18**
	4.1	Introduction to Unsupervised learning	Understand	2
	4.2	K-Means Algorithm	Understand	2
	4.3	K-Means – Variations	Understand, Analyse	2
	4.4	Detecting Outliers	Understand, Analyse	2
	4.5	Hierarchical Clustering	Understand	2
	4.6	Association Rule Mining	Understand, Analyse	2
	4.7	Apriori Algorithm	Understand, Analyse	2
	4.8	Time series Prediction	Understand, Analyse	2
	4.9	Markov Process	Understand	1
	4.10	Hidden Markov Model	Understand, Analyse	1
5	**Natural Language Processing**			**11**
	5.1	Introduction to NLP	understand	2

	5.2	Application of NLP	Understand, Analyse	2
	5.3	Classical Vs Deep Learning Models	Understand, Analyse	2
	5.4	Bag of words model	Understand, Apply	3
	5.5	Tools and techniques for NLP	Understand	2

Course Modules and Course Outcomes Mapping:	#	Module	CourseOutcomes				
			CO1	CO2	CO3	CO4	CO5
	1	Introduction to Machine Learning Techniques	☐				
	2	Regression		☐			
	3	Classification			☐		
	4	Unsupervised Learning & Association Rule Mining				☐	
	5	Natural Language Processing					☐

Text Books/ Resources:	1. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, "Machine Learning", Pearson
Reference Books/ Resources	1. Aurelien Geron ,"Hands–On Machine Learning with Scikit–Learn and TensorFlow"(3rd Edition") Paperback, 2017. 2. Sebastian Raschka ,Vahid Mir Jalili, "Python Machine Learning", Third Edition Packt Publications, 2019. 3. Kevin P. Murph, "Machine learning: a probabilistic perspective", MIT Press, 2012.

SYLLABUS

PROGRAM: MCA   SEMESTER: III

Course Code: MCA DSE 302-T	Credit: 04	Course: Responsive and User Experience (UX) Web Design	L: 04 | T: 00 | P: 04
Prerequisites:	Nil		
Objectives:	Familiarize students with the knowledge and skills to design intuitive, user-friendly interfaces and create meaningful user experiences.		
Course Outcome:	Upon successfully finishing the course, students will have the capability to:		

	No.	Course Outcome	BT Level
	CO1	Understand core concepts of UI/UX and its importance in product design.	Understanding, Apply,
	CO2	Students will be able to create a simple style guide with accessible color contrast.	Understanding, Apply, Analysis
	CO3	Students will understand what responsive design is and why it is needed.	Understanding, Apply, Analysis
	CO4	Students will be able to build simple wireframes using a tool.	Understanding, Apply, Analysis
	CO5	Students will design and present a simple responsive interface as a final project.	Understanding, Apply, Analysis

Program Outcomes and Course Outcomes Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	√		√								√	
CO2			√		√				√	√		
CO3	√		√							√		
CO4			√		√			√		√		
CO5		√	√	√	√			√	√		√	

Curriculum

No.	Module Description		BT Level	Hours
1	**Introduction to UI & UX**			**9**
	1.1	Basics of User Interface (UI) and User Experience (UX)	U	3

	1.2	Principles of good design (simplicity, consistency, feedback)	U, AP	3
	1.3	Understanding user needs and basics of user research	U, AN	3
2	**Visual Design Foundations**			**9**
	2.1	Color theory and typography for interfaces	U, AP	3
	2.2	Layouts, grids, and spacing for web and mobile	U, AP	3
	2.3	Accessibility, contrast, and creating simple style guides	U, AP, AN	3
3	**Responsive Web Design Basics**			**9**
	3.1.	Introduction to responsive design and why it matters	U, Ap	3
	3.2.	Fluid grids, flexible images, and media queries	U, AN	3
	3.3.	Mobile-first approach and designing for multiple devices	U, AN	3
4	**UX Process and Tools**			**9**
	4.1.	User journeys, personas, and mapping user flows	U, NP	3
	4.2.	Prototyping tools (Figma, Adobe XD) and creating wireframes	U, AP	3
	4.3.	Usability testing and iterating designs based on feedback	U, AP, AN	3
5	**Advanced Interaction and Project**			**9**
	5.1.	Micro-interactions (hover, swipe, animations)	U, AP	3
	5.2.	Designing intuitive navigation and performance considerations	U, AN	3
	5.3.	Final mini-project – Design and present a responsive app or website	AP, c	3

Course Modules and Course Outcomes Mapping:	#	Module	Course Outcomes				
			CO1	CO2	CO3	CO4	CO5
	1	**Introduction to UI & UX**	✓				
	2	**Visual Design Foundations**		✓			
	3	**Responsive Web Design Basics**			✓		
	4	**UX Process and Tools**				✓	
	5	**Advanced Interaction and Project**					✓

Text Books/ Resources:	1. Don Norman – *The Design of Everyday Things* 2. Wilbert O. Galitz - The Essential Guide to User Interface Design.
Reference Books/Resources	1. Bansal, S.K. (2019). *User Interface Design.* Laxmi Publications. 2. https://www.geeksforgeeks.org/techtips/user-experience-or-ux-design/ 3. https://www.figma.com/resources/learn-design/

SYLLABUS

PROGRAM: MCA   SEMESTER: III

Course Code: MCA DSE 305-T	Credit: 04	Course: Artificial Intelligence	L: 03 | T: 01 | P: 00
Prerequisites:	Basic Mathematics and Logical Thinking		
Objectives:	Understanding the fundamentals of digital electronics is crucial for anyone working in fields such as computer science, electrical engineering, or information technology.		
Course Outcome:	Upon successfully finishing the course, students will have the capability to:		

	No.	Course Outcome	BT Level
	CO1	Introduce students to the concepts and principles of Artificial Intelligence (AI).	Understand, Apply
	CO2	Explain the algorithms in the various subfields of AI.	Understand, Apply,
	CO3	Understand and apply basic problem-solving strategies such as divide and conquer, greedy algorithms, and dynamic programming.	Understand, Apply, Analyze
	CO4	Implement various search and traversal algorithms such as breadth-first search, depth first search, and binary search.	Understand, Apply, Analyze
	CO5	Familiarize students with the history and evolution of AI and its impact on society	Understand, Apply, Analyze

Program Outcomes and Course Outcomes Mapping:	Course Outcomes	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1	√		√	√								
	CO2	√		√	√								
	CO3	√		√	√								
	CO4	√	√	√	√								
	CO5	√		√	√	√							

		Module Description	BT Level	Hours
1		**Introduction to Artificial Intelligence.**		8
	1.1	Introduction: What Is AI?	Understand	1
	1.2	The Foundations of Artificial Intelligence.	Understand, Apply	1
	1.3	The History of Artificial Intelligence, AI Techniques, advantages, and limitations of AI, Impact and Examples of AI, Application domains of AI.	Understand, Apply	1
	1.4	The State of the Art.	Understand, Apply	1
	1.5	Intelligent Agents: Agents and Environments.	Understand, Apply	2
	1.6	Good Behavior: The Concept of Rationality.	Understand, Apply	1
	1.7	The Nature of Environments.	Understand, Apply	1
	1.8	The Structure of Agents.	Understand, Apply	1
2		**Introduction to Algorithms in Artificial Intelligence.**		

	2.1	Introduction to Algorithms in Artificial Intelligence: Definition	Understand	1
	2.2	Significance of algorithms in artificial intelligence.	Understand, Apply	1
	2.3	Basic components of an algorithm: input, output,	Understand	1
	2.4	Control structures.	Understand, Apply	1
	2.5	Introduction to problem-solving techniques in Artificial Intelligence	Understand, Apply	2
	2.6	Knowledge representation.	Understand, Apply	2
	2.7	Reasoning.	Understand, Apply	2
3	**Search Algorithms**			
	3.1	Introduction to search algorithms	Understand, Analyze	1
	3.2	Depth-first search.	Understand, Analyze	1
	3.3	Breadth-first search	Understand, Analyze	1
	3.4	Heuristic search techniques	Understand, Analyze	2
	3.5	A* search	Understand, Analyze	2
		Hill climbing, Min-Max Search, Alpha-Beta.	Understand, Analyze	1
4	**Introduction to neural networks and Expert System**			
	4.1.	Models of neuron McCulloch – Pitts model.	Understand, Analyze	2
	4.2.	Perceptron, Adaline model, Basic learning laws.	Understand, Apply	2
	4.3.	Topology of neural network architecture, Multilayer Neural Networks, Learning Methods.	Understand, Apply	3

	4.4	The human element in expert systems.	Understand, Apply	3
5		**Introduction of Fuzzy logic and Neuro Fuzzy Systems and Case Study with Artificial Intelligence**		
	5.1	Fuzzy sets, Fuzzy model, Fuzzy rule generation Fuzzy inference system.	Understand, Apply	2
	5.2	Integrating Artificial Intelligence in Yoga Applications.	Understand, Analyze	2
	5.3	Personalized yoga routines based on user preferences and goals.	Understand, Analyze	2
	5.4	AI-powered progress tracking and performance analytics.	Understand, Analyze	3
	5.5	Design considerations for AI-enhanced yoga applications.	Understand, Apply	3

Text Books/ Resources:	1. "Artificial Intelligence" by Stuart Russell and Peter Norvig, Third Edition 2010, Pearson Education, Inc. 2. "Artificial Intelligence: Foundations of Computational Agents" by David L. Poole and Alan K. Mackworth. 3. "Introduction to Artificial Intelligence and Expert Systems" by Dan W. Patterson, Publisher. Pearson Education India, 2015, Pages 464. 4. Introduction to Neural Network Using MatLab 6.0 by Dr. S N Sivanandam. 5. Neural Network Design by Martin T. Hagan.
Reference Books/ Resource	1. "Artificial Intelligence" by Rich, E., Knight, K., & Nair, S. (2009), Tata McGraw Hill. 2. " AI Algorithms Lab: Hands-On Exercises in Artificial Intelligence" by John Smith (Year: 2023). **SWAYAM NPTEL/MOOCs:** 1. https://onlinecourses.nptel.ac.in/noc22_cs56/preview 2. https://onlinecourses.nptel.ac.in/noc23_cs18/preview **GitHub Links:** 1. https://github.com/topics/artificial-intelligence.

SYLLABUS

PROGRAM: MCA   SEMESTER: III

Course Code: MCA DSE 304 -T	Credit: 03	**Course:** Advance Web Development	L: 03 | T: 01 | P: 00
Prerequisites:	The prerequisites for advanced web development with Laravel, React, and Angular include a solid understanding of HTML, CSS, JavaScript, PHP, RESTful APIs, and version control with Git, along with experience in object-oriented programming and asynchronous programming.		
Objectives:	The objective of advanced web development with Laravel, React, and Angular is to build scalable, high-performance, and dynamic web applications by leveraging modern frameworks and technologies for efficient front-end and back-end development.		
Course Outcome :	Upon successfully finishing the course, students will have the capability to:		

	No.	Course Outcome	BT Level
	CO1	Students will be able to design fully responsive web interfaces using Bootstrap, advanced CSS layouts, and modern JavaScript (ES6+) with effective event handling.	Understand, Apply, Analyze
	CO2	Students will understand Laravel's MVC structure and develop dynamic applications using routing, middleware, Blade templates, controllers, models, and form validation.	Understand, Apply
	CO3	Students will efficiently manage database operations using Eloquent ORM, implement migrations, CRUD, relationships, and apply indexing and optimization techniques.	Understand, Apply, Analyze
	CO4	Students will be able to secure applications with authentication/authorization, build RESTful APIs, and apply debugging, error handling, and testing practices.	Apply, Analyze, Evaluate
	CO5	Students will deploy Laravel applications on servers/cloud, use Git for version control, and build a complete capstone project following professional development practices.	Apply, Analyze, Evaluate

Program Outcomes and Course Outcomes Mapping:	Course Outcomes	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1	✓	✓	✓	✓			✓					
	CO2	✓	✓	✓	✓			✓					
	CO3	✓	✓	✓	✓			✓					
	CO4	✓	✓	✓	✓			✓					
	CO5	✓	✓	✓	✓			✓					

Curriculm				
No.	**Module Description**		**BT Level**	**Hours**
1	**Advanced Frontend with Bootstrap & Modern Web Practices**		**U, AP, AN**	**8**
	1.1	Bootstrap Framework – Grid system, utilities, components, responsive design.	U	2
	1.2	Advanced CSS (Flexbox & Grid Layouts)	U,AP	2
	1.3	JavaScript ES6+ Features	U,AP	2
	1.4	Event Handling with JS	AP,AN	2
2	**Laravel Basics**		**U, AP**	**8**
	2.1	MVC architecture & Artisan CLI	U	2
	2.2	Routing & Middleware	U,AP	2
	2.3	Blade templating, Controllers & Models	AP	3
	2.4	Validation & Forms in Laravel	AP,AN	2
3	**Database & ORM**		**U, AP, AN**	**10**
	3.1	Eloquent ORM basics	U,AP	2
	3.2	Migrations & Seeders	AP	2
	3.3	CRUD operations with ORM	AP,AN	2
	3.4	Relationships in ORM Database indexing & optimization	AP,AN	2
	3.5	Database indexing & optimization	AN,EV	2
4	**Advanced Laravel Features**		**AP,AN,EV**	**8**
	4.1	Authentication & Authorization	AP,AN	2
	4.2	RESTful API development	AP,AN	2
	4.3	Error Handling & Debugging	AN	2
	4.4	Testing in Laravel	AN,EV	2

5		**Deployment & Project Work**	AP,AN,EV	11
	5.1	Laravel project structure review	U	2
	5.2	Deployment on Apache/Nginx	AP	2
	5.2	Version control with Git	AP	2
	5.4	Cloud hosting (Heroku/AWS)	AP,AN	2
	5.5	Capstone Project Development	AP,AN,EV	3

Course Modules and Course Outcomes Mapping:	#	Module	Course Outcomes				
			CO1	CO2	CO3	CO4	CO5
	1	Advanced Frontend with Bootstrap & Modern Web Practices	✓				
	2	Laravel Basics		✓			
	3	Database & ORM			✓		
	4	Advanced Laravel Features				✓	
	5	Deployment & Project Work					✓

Reference Books/ Resources	1. DRISHTI JAIN, "Ultimate Laravel for Modern Web Development" : 2. MATT STAUFER"Laravel: Up & Running" 3. ALFRED NUTILE"Laravel 5.x Cookbook" 4. https://www.codinghood.de/news/the-best-laravel-tutorials-and-resources-for-developers/?utm_source=chatgpt.com 5. https://laravel.com/ 6. https://www.tutorialspoint.com/laravel/index.htm . 7. https://web.dev/learn

SYLLABUS

PROGRAM: MCA   SEMESTER: III

Course Code: MCA DSE 306	Credit: 02	Course: Internet Of Things	L: 1	T: 01	P: 00
Prerequisites:	Basic Internet of Things Concepts		
Objectives:	Gain a solid foundation in IoT concepts, including the architecture, protocols, and technologies involved. Explore the components of IoT systems such as sensors, actuators, connectivity, and data processing.		
Course Outcome:	Upon successfully finishing the course, students will have the capability to:		

	No.	Course Outcome	BT Level
	CO1	Student get proficiency to the Internet Of Things its basicconcepts like IoT architecture and it's concepts, communication model and communication protocols LED, buzzer,LCD.	Understand
	CO2	Students gain an understanding of IoT and apply the concepts, including sensors, actuators, and communication protocols.	Apply
	CO3	Students are capable of designing and developing IoT applications, managing IoT devices and systems. Also performing operations such as data transmission and device control.	Apply

Program Outcomes and Course Outcomes Mapping:	Course Outcomes	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1	√	√	√	√								
	CO2	√	√	√	√								
	CO3	√	√	√	√								

No.		Module Description	BT Level	Hours
1		**Fundamentals of IoT**		**11**
	1.1	Introduction, Definitions & Characteristics, Challenges of IoT.	Understand	1
	1.2	IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT.	Analyze	2
	1.3	History of IoT, About Things in IoT.	Analyze	2
	1.4	The Identifiers in IoT, About the Internet in IoT	Understand	3
	1.5	IoT frameworks, IoT and M2M.	Analyze	3
2		**Sensors Networks**		**11**
	2.1	Definition, Types of Sensors, Types of Actuators, Examples and Working,	Understand	2
	2.2	IoT Development Boards: Arduino IDE and Board Types, Raspberri Pi Development Kit	Analyze	2
	2.3	RFID Principles and components,	Analyze	2
	2.4	History and Context	Understand	2
	2.5	The node, Connecting nodes, Networking Nodes, WSN and IoT.	Understand	3
3		**Applications of IoT**		**08**

	3.1	Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT	Analyze	3
	3.2	Legal challenges, IoT design Ethics	Analyze	3
	3.3	IoT in Environmental Protection.	Analyze	2

Text Books/ Resources:	1. CunoPfister, "getting started with the Internet of Things : Connecting Sensors and MicroController to the Cloud"kindle2011 : TB#1 2. ArsheepBagha ,Vijay Madisetti,"Internet of Things":A Hands On
Reference Boo ks/ Resourc e	1. https://github.com/jollyvjacob/Books/blob/master/book/Internet%20of%20 Things%20wit h%20ESP8266.pdf 2. https://youtu.be/WUYAjxnwjU4?si=e2svqjWRREf9SZL9

CURRICULUM

PROGRAM: MCA   SEMESTER: III

Course Code: MCA DSE 307	Credit: 04	Course: Cloud Computing	L: 03 | T: 01 | P: 00
Prerequisites:	Nil		
Objectives:	The objective of this course is to make the student understand and implement the core concepts of object orientated programming.		
Course Outcome:	Upon successfully finishing the course, students will have the capability to:		

	No.	Course Outcome	BT Level
	CO1	Understand the fundamentals and architecture of cloud computing.	Understand
	CO2	Apply concepts of service, data, and resource management in the cloud.	Analysis
	CO3	Analyze cloud security challenges and solutions	Understand
	CO4	Evaluate emerging trends such as Fog, Edge, and Serverless computing.	Analysis
	CO5	Demonstrate practical understanding through case studies, simulators, and recent advancements.	Apply

Program Outcome:	Upon successfully finishing the program, students shall be able to:	
	No.	Program Outcome
	PO1	Computational Knowledge: Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
	PO2	Problem Analysis: Identify, formulate, research literature, and solve complex computingproblems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
	PO3	Design /Development of Solutions: Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
	PO4	Conduct investigations of complex Computing problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, andsynthesis of the information to provide valid conclusions.
	PO5	Modern Tool Usage: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of thelimitations.

	PO6	Professional Ethics: Understand and commit to professional ethics and cyber regulations,responsibilities, and norms of professional computing practices.
	PO7	Life-long Learning: Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
	PO8	Project management and finance: Demonstrate knowledge and understanding of the computingand management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
	PO9	Communication Efficacy: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and writeeffective reports, design documentation, make effective presentations, and give and understand clear instructions.
	PO10	Societal and Environmental Concern: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.
	PO11	Individual and Team Work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
	PO12	Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursuethat opportunity to create value and wealth for the betterment of the individual and society at large.

Program Outcomes and Course Outcomes Mapping:	Course Outcomes	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1	✓		✓		✓	✓						
	CO2	✓	✓	✓		✓			✓				
	CO3	✓	✓	✓	✓	✓	✓						
	CO4	✓	✓	✓	✓	✓							
	CO5	✓	✓	✓	✓			✓	✓				

No.		Module Description	BT Level	Hours
1		**Fundamentals of Cloud Computing**	**U, AP**	**8**
	1.1	Introduction to Cloud Computing	U, AP	4
	1.2	Cloud Computing Architecture	U, AP	4
2		**Cloud Service and Data Management**	**U, AP, AN**	**15**
	2.1	Service Management in Cloud Computing	U	5
	2.2	Data Management in Cloud Computing	U,	6
	2.3	Resource Management in Cloud	U,	4

3	**Cloud Security and Platforms**		**U, AP, AN**	**15**
	3.1	Cloud Security	U, AP	4
	3.2	Open Source and Commercial Clouds	U, AP	5
	3.3	Cloud Simulator	U, AP	6
4	**Emerging Trends in Cloud**		**U, AN**	**15**
	4.1	Research Trends in Cloud Computing	U, AN	4
	4.2	Fog Computing	U, AN	2
	4.3	VM Resource Allocation, Management, and Monitoring	U, AN	4
	4.4	Cloud-Fog-Edge Enabled Analytics	U, AN	3
	4.5	Serverless Computing and FaaS Model	U, AP	2
5	**Case Studies and Advancements**		**U, AP, AN**	**7**
	5.1	Case Studies	U	4
	5.2	Recent Advancements in Cloud Computing	U	3

Course Modules and Course Outcomes Mapping:	#	Module	Course Outcomes				
			CO1	CO2	CO3	CO4	CO5
	1	Fundamentals of Cloud Computing	✓				
	2	Cloud Service and Data Management		✓			
	3	Cloud Security and Platforms			✓		
	4	Emerging Trends in Cloud				✓	
	5	Case Studies and Advancements					✓

Text Books/ Resources:	1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley,2011 2. Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010 3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010 4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley- India,2010

SYLLABUS

PROGRAM: MCA   SEMESTER: IV

Course Code: MCA DSC 401	Credit: 02	Course: Organizational behavior and Professional Ethics	L: 02	T: 00	P: 00

Prerequisites:	Nil
Objectives:	The objective of Organizational Behavior is to understand and improve individual and group dynamics within an organization to enhance performance, while Professional Ethics aims to promote ethical conduct and decision-making in the workplace.
Course Outcome:	Upon successfully finishing the course, students will have the capability to:

	No.	Course Outcome	BT Level
	CO1	Understand the key concepts and theories related to organizational behavior and their application in real-world settings.	Understand
	CO2	Analyze how individual differences influence behavior and performance within an organization.	Apply
	CO3	Evaluate and apply various motivation theories to enhance employee performance and satisfaction.	Apply
	CO4	Examine how group behavior and team dynamics affect decision-making and productivity in organizations	Apply
	CO5	Identify and assess different leadership styles and power dynamics that influence organizational success.	Analyze

Program Outcomes and Course Outcomes Mapping:	Course Outcomes	Program Outcomes											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO1									✓	✓	✓	✓
	CO2									✓	✓	✓	✓
	CO3									✓	✓	✓	✓
	CO4									✓	✓	✓	✓
	CO5									✓	✓	✓	✓

Syllabus

No.		Module Description	BT Level	Hours
1		**Introduction to Organizational Behavior**		15
	1.1	Definition and Importance of Organizational Behavior (OB)	Understand	3
	1.2	Foundations of OB: Psychological, Social, and Cultural Influences	Understand	3
	1.3	Key Concepts in OB: Motivation, Leadership, Communication, Teamwork, etc.	Understand	3
	1.4	Levels of Analysis**:** Individual.	Understand	3
	1.5	Group, and Organizational	Understand	3
2		**Individual Behavior in Organizations**		15
	2.1	Personality and its Impact on Work Behavior,Types of Personality Models (Big Five, MBTI)	Analyze	3
	2.2	Perception and Decision Making,Process of Perception,Biases in Decision Making	Analyze	3
	2.3	Attitudes**:** Job Satisfaction, Organizational Commitment, and Engagement	Understand	3
	2.4	Emotions in the Workplace	Analyze	3
	2.5	Type of emotions	Analyze	3

3		**Entrepreneurship and Motivation Theories**		10
	3.1.	Classical Motivation Theories, Maslow's Hierarchy of Needs Herzberg's Two-Factor Theory, McGregor's Theory X and Y	Apply	2
	3.2.	Entrepreneurship Small Business Entrepreneurship, Scalable Start- up Entrepreneurship, Social Entrepreneurship and Large Company Entrepreneurship.	Apply	2
	3.3.	Goal Setting Theory (Locke & Latham),	Apply	2
	3.4.	Equity Theory (Adams Self-Determination Theory	Apply	2
	3.5	Motivational Techniques in Organizations		2
4		**Group Behavior and Team Dynamics**		**10**
	4.1.	Types of Groups**:** Formal and Informal Groups	Understand	2
	4.2.	Group Development Stages (Tuckman's Model)	Understand	3
	4.3.	Teamwork and Team Effectiveness	Understand	2
	4.4.	Conflict in Groups and Conflict Resolution Strategies	Understand	3
5		**Leadership and Power in Organizations**		**10**
	5.1.	Leadership Theories, Trait Theory, Behavioral Theories, and Contingency Models (e.g., Fiedler's Contingency Theory), Transformational and Transactional Leadership, Servant Leadership	Understand	2
	5.2.	Power and Politics in Organizations	Understand	3
	5.3.	Sources of Power, Organizational Politics and Influence Tactics	Understand	2
	5.4.	Ethical Leadership	Understand	3

Course Modules and Course Outcomes Mapping:	#	Module	Course Outcomes				
			CO1	CO2	CO3	CO4	CO5
	1	Introduction to Organizational Behavior	✓				
	2	Individual Behavior in Organizations		✓			
	3	Motivation Theories			✓		
	4	Group Behavior and Team Dynamics				✓	
	5	Leadership and Power in Organizations					✓

Textbooks/ Resources:	1. **"**Organizational Behavior" by Stephen P. Robbins and Timothy A. Judge 2. "Organizational Behavior: A Practical, Problem-Solving Approach" by Debra L. Nelson and James Campbell Quick 3. "Essentials of Organizational Behavior" by Stephen P. Robbins and Timothy A. Judge
Reference Books/ Resources	1. "The Moral Compass of the Corporation: Business Ethics and the Path to Corporate Social Responsibility" by Denise Rousseau. 2. "Ethics in the Workplace: Tools and Tactics for Organizational Transformation" by Craig E. Johnson