MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE

MADANAPALLE

(UGC-AUTONOMOUS)

www.mits.ac.in

DEPARTMENT OF COMPUTER APPLICATIONS

Course Structure

And

Detailed Syllabus (R24)

For the students admitted to

Master of Computer Applications from the academic year 2024-25 batch onwards

Vision and Mission of the Institution

Vision

To become a globally recognized research and academic institution and thereby contribute to technological and socio -economic development of the nation.

Mission

To foster a culture of excellence in research, innovation, entrepreneurship, rational thinking and civility by providing necessary resources for generation, dissemination and utilization of knowledge and in the process create an ambience for practice-based learning to the youth for success in their careers.

Vision and Mission of the Department

Vision

To be the source of producing competent computer application professionals in academic and research activities to serve the industry and society.

Mission

M1: To empower students with knowledge of computer applications through state-of-art infrastructure and curriculum.

M2: To groom students to become competent professionals in emerging technologies with industry specific programs.

M3: To inculcate ethical values, leadership and managerial skills in the students.

PROGRAMME OUTCOMES

The Programme Outcomes (POs) outline the key skills, knowledge, and competencies students must acquire upon completing the Master of Computer Applications (MCA). These outcomes aim to prepare students for successful careers in the rapidly evolving field of computer science and information technology.

PO1 (Foundation Knowledge):

Apply knowledge of mathematics, programming logic and coding fundamentals for solution architecture and problem solving.

PO2 (Problem Analysis):

Identify, review, formulate and analyse problems for primarily focussing on customer requirements using critical thinking frameworks.

PO3 (Development of Solutions):

Design, develop and investigate problems with as an innovative approach for solutions incorporating ESG/SDG goals.

PO4 (Modern Tool Usage):

Select, adapt and apply modern computational tools such as development of algorithms with an understanding of the limitations including human biases.

PO5 (Individual and Teamwork):

Function and communicate effectively as an individual or a team leader in diverse and multidisciplinary groups. Use methodologies such as agile.

PO6 (Project Management and Finance):

Use the principles of project management such as scheduling, work breakdown structure and be conversant with the principles of Finance for profitable project management.

PO7 (Ethics):

Commit to professional ethics in managing software projects with financial aspects. Learn to use new technologies for cyber security and insulate customers from malware

PO8 (Life-long learning):

Change management skills and the ability to learn, keep up with contemporary technologies and ways of working.

PROGRAM EDUCATIONAL OBJECTIVES

The MCA graduates will be able to:

PEO1: Excel in the software industry with the application of comprehensive knowledge and skills.

PEO2: Contribute by building innovative and sustainable solutions to the problems in the IT industry.

PEO3: Become successful professionals, exhibiting social responsibility leading to lifelong learning.

R24 - Course Structure

MCA I Year I Semester

S.No	Course Code	Course Title	L	T	P	C
1	24MATP101	Mathematical Foundations for Computer Applications	3	1	0	4
2	24MCAP101	Database Management Systems	3	1	0	4
3	24MCAP102	Data Structures and Algorithms	3	1	0	4
4	24MCAP103	Python Programming	3	1	0	4
5	24MCAP104	Operating Systems	3	1	0	4
6	24MCAP201	Database Management Systems Laboratory	0	0	3	1.5
7	24MCAP202	Data Structures and Algorithms Laboratory (Using C)	0	0	3	1.5
8	24MCAP203	Python Programming Laboratory	0	0	3	1.5
9		Skill Enhancement Course-I (Refer ANNEXURE – III)	2	0	2	3
		Total	**17**	**5**	**11**	**27.5**

MCA I Year II Semester

S.No	Course Code	Course Title	L	T	P	C
1	24MCAP105	Java Programming	3	1	0	4
2	24MCAP106	Computer Networks and Security	3	1	0	4
3	24MCAP107	Artificial Intelligence	3	1	0	4
4	24MCAP108	Software Engineering	3	1	0	4
5		Discipline Elective – I *(Refer ANNEXURE – II)*	4	0	0	4
6	24MCAP204	Java Programming Laboratory	0	0	3	1.5
7	24MCAP205	Computer Networks and Security Laboratory	0	0	3	1.5
8	24MCAP206	Artificial Intelligence Laboratory	0	0	3	1.5
9		Skill Enhancement Course-II *(Refer ANNEXURE – III)*	2	0	2	3
10	24MCAP901	Audit Course *(Refer ANNEXURE – IV)*	2	0	0	0
		Total	**20**	**4**	**11**	**27.5**

MCA II Year I Semester (Tentative)

S. No	Course Code	Course Title	L	T	P	C
1	24MCAP109	Full Stack Web Development	3	1	0	4
2	24MCAP110	Data Science	3	1	0	4
3		Discipline Elective – II *(Refer ANNEXURE – II)*	4	0	0	4
4		Discipline Elective – III *(Refer ANNEXURE – II)*	4	0	0	4
5		Open Elective – I *(Refer ANNEXURE – I)*	4	0	0	4
6	24MCAP207	Full Stack Web Development Laboratory	0	0	3	1.5
7	24MCAP208	Data Science Laboratory using Python	0	0	3	1.5
8	24MCAP902	Technical Seminar I / Innovation and Entrepreneurship	0	0	4	2
9	24MCAP701	Mini Project	0	0	6	3
		Total	**18**	**2**	**16**	**28**

MCA II Year II Semester (Tentative)

S.No	Course Code	Course Title	L	T	P	C
1	24MCAP702	Comprehensive Viva/Technical Seminar	0	0	8	4
2	24MCAP703	Major Project/Internship	0	0	30	15
		Total	**0**	**0**	**38**	**19**

ANNEXURE – I

LIST OF OPEN ELECTIVES

Open Elective – I

S.No	Course Code	Course Title	L	T	P	C
1	24MBAP301	Management and Organizational Behavior	4	0	0	4
2	24MBAP302	Design Thinking	4	0	0	4
3	24MBAP303	Management Information Systems	4	0	0	4
4	24MBAP304	E-Commerce and Digital Markets	4	0	0	4
5	24MBAP305	Entrepreneurship Development and Project Management	4	0	0	4

ANNEXURE – II

LIST OF DISCIPLINE ELECTIVES

Discipline Elective – I

S.No	Course Code	Course Title	L	T	P	C
1	24MCAP401	Machine Learning	4	0	0	4
2	24MCAP402	Micro Controllers and Embedded Systems	4	0	0	4
3	24MCAP403	Agile Methodologies	4	0	0	4
4	24MCAP404	Computer Graphics and Multimedia	4	0	0	4
5	24MCAP405	Image Processing	4	0	0	4
6	24MCAP406	Blockchain Technology	4	0	0	4
7	24MCAP407	XML and Web Services	4	0	0	4
8	24MCAP408	Cyber security	4	0	0	4
9	24MCAP409	Cloud Computing	4	0	0	4

Discipline Elective – II

S.No	Course Code	Course Title	L	T	P	C
1	24MCAP410	Deep Learning	4	0	0	4
2	24MCAP411	Wireless Sensor Networks	4	0	0	4
3	24MCAP412	Dev Ops and Micro services	4	0	0	4
4	24MCAP413	Virtual Reality	4	0	0	4
5	24MCAP414	Video Analytics	4	0	0	4
6	24MCAP415	Applied Cryptography	4	0	0	4
7	24MCAP416	Advanced Web Development	4	0	0	4
8	24MCAP417	Digital Forensics	4	0	0	4
9	24MCAP418	Edge Computing	4	0	0	4

Discipline Elective – III

S.No	Course Code	Course Title	L	T	P	C
1	24MCAP419	Generative AI	4	0	0	4
2	24MCAP420	IOT Architecture and Protocols	4	0	0	4
3	24MCAP421	Software Project Management	4	0	0	4
4	24MCAP422	Augmented Reality	4	0	0	4
5	24MCAP423	Computer Vision	4	0	0	4
6	24MCAP424	Firewall and VPN Security	4	0	0	4
7	24MCAP425	Mobile Application Development	4	0	0	4
8	24MCAP426	Penetration Testing	4	0	0	4
9	24MCAP427	Fog Computing	4	0	0	4

ANNEXURE – III

LIST OF SKILL ENHANCEMENT COURSES

Skill Enhancement Course-I						
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	24ENGP601	Corporate Communication	2	0	2	3
Skill Enhancement Course-II						
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	24MCAP601	Frontend Web development	2	0	2	3
Any Skill- Enhancement courses can be appended in future.						

ANNEXURE – IV

List of Audit Courses

S.No	Course Code	Course Title	L	T	P	C
1	24MCAP901	Research Methodology and IPR	2	0	0	0
Swayam NPTEL MOOCs (Students can opt to be assessed either in conventional mode or through proctored examinations conducted by Swayam NPTEL). Swayam NPTEL MOOCs Any research and Entrepreneurship related courses can be appended in future.						

MCA I Year I Semester

MCA I Year I Semester

24MATP101 MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS

L	T	P	C
3	1	0	4

Pre-requisite Basic Calculus, Set theory, Relations, Functions, Basics of counting

Course Description:

This course provides a comprehensive understanding of the mathematical concepts and techniques essential for computer applications. It covers a range of topics, including Probability, random variables, probability distributions, propositional logic, modular arithmetic, graph theory and recurrence relations. The course is designed to equip students with the foundational mathematical reasoning skills necessary for advanced studies and system applications in computer science.

Course Objectives:

This course enables students to

1. To extend and formalize the knowledge of the theory of probability and Random Variables.
2. To solve the real time problems by using probability distributions.
3. Develop the skills to formulate the formal logical expressions and construct its validity.
4. Understand Operational and Counting Principles with suitable illustrations.
5. Explore Graph Theoretical concepts with their representing systems and terminologies.

UNIT I PROBABILITY 12 hours

Probability- probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem. Random variables- Discrete and Continuous random variables, probability density functions, properties, mathematical expectations, Joint densities and independence, moment generating function

UNIT II PROBABILITY DISTRIBUTIONS 12 hours

Discrete Probability Distributions – Geometric, Binomial, Poisson distributions and their properties
Continuous Probability Distributions – Gamma, Exponential, Normal distributions and their properties

UNIT III THE FOUNDATION OF MATHEMATICAL REASONING 12 hours

Basic terminologies and logic connectives, Propositional logic, Translation between English and propositional logic, Logical equivalence, Tautologies, Rules of inference for propositional logic, Normal forms.

UNIT IV THE FOUNDATIONS OF OPERATIONAL AND COUNTING PRINCIPLES 12 hours

Introduction to modular arithmetic, The Euler phi function, Binary Relations, Boolean matrices, Properties of binary relations, Equivalence relations, Order relations, the Hasse diagram, Special elements in a poset, lattices, Properties of Lattices, Basic counting principles, The pigeonhole principle.

UNIT V THE FOUNDATIONS OF GRAPH THEORY 12 hours

Basic definitions and terminology, Matrix Representation of Graphs, Subgraphs and new graphs from old, Walks, trails, paths, cycles and graph connectivity, Isomorphism of simple graphs, Hamiltonian circuits and Hamiltonian paths, Graph coloring, Trees, Traversal of trees, Spanning subtrees, Minimal spanning trees.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Understand the concepts of probability and random variables and analyze the real time problems.
CO2: Solve various real time problems through probability distributions.
CO3: Demonstrate proficiency in translating between natural language statements and formal logical expressions through the concepts of inference.
CO4: Utilize modular arithmetic in various computational contexts and apply counting principles to solve many combinatorial problems.
CO5: Construct and apply graph theory models to implement algorithms for traversal and minimal spanning trees.

Text Book(s)

1. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.

2. Joseph Khoury, Tale of Discrete Mathematics, A: A Journey Through Logic, Reasoning, Structures and Graph Theory, 1st Edition, 2024, World Scientific Publishing Co Pvt. Ltd.

Reference Books

1. S. C Gupta and V.K Kapoor, Fundamentals of Mathematical Statistics, 11th edition 2010 Sultan Chand & Sons, New Delhi.

2. DR. D.S.C, Mathematical Foundation of Computer Science, 3rd Edition, 2006, Prism Books Pvt Ltd.

3. Gerard O'Regan, Guide to Discrete Mathematics: an accessible introduction to the history, theory, logic and applications, 2nd edition, 2021, Springer.

4. Kevin Ferland, Discrete Mathematics and Applications, 2nd Edition, 2017, CRC Press Taylor & Francis Group.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

MCA I Year I Semester

24MCAP101 DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	1	0	4

Pre-requisite None

Course Description:

This course is designed to investigate how database management system techniques are used to design, develop, implement and maintain database applications in organizations.

Course Objectives:

This course enables students to

1. Explain data base concepts and its applications, data base system structure and ER data modeling.
2. Illustrate the relational model, DDL, DML and Relational Algebra.
3. Demonstrate Schema refinement and Normal Forms.
4. Explain transactions and its management, concurrency control schemes and recovery.
5. Familiar with basic database storage structures, indexing methods including B tree and hashing.

UNIT I INTRODUCTION 12 hours

Introduction to data bases, Database system Vs File system, Data abstraction, Instances and Schemas, Database users, Database system structure, Entities, Attributes, Entity sets, Relationships and Relationship sets, Database design and ER diagrams, Specialization and Generalization and participation features of ER model.

UNIT II RELATIONAL MODEL AND QUERY EVALUATION 12 hours

Relational Model Concepts – Relational Algebra – SQL – Basic Queries DDL, DML, DCL, TCL– Complex SQL Queries – Views – Constraints.

UNIT III DATABASE DESIGN 12 hours

Functional Dependencies – Properties of relational Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT IV TRANSACTION PROCESSING 12 hours

Query Processing-Transaction Processing – Properties of Transactions - Serializability – Transaction support in SQL - Locking Techniques –Validation Techniques — Recovery concepts – Shadow paging – Log Based Recovery – Introduction to PL/SQL & NOSQL

UNIT V FILES AND INDEXING **12 hours**

File operations – Hashing Techniques – Indexing – Single level and Multi-level Indexes – B+ tree – Static Hashing. Case study – Indexed Sequential Access Method (ISAM)

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Understand the basic concepts and the applications of database systems.
CO2: Implement the relational model and construct queries using SQL.
CO3: Apply the relational database design principles.
CO4: Illustrate the concepts of transaction processing, concurrency control and recovery
CO5: Apply the knowledge of database storage structures and indexing methods.

Text Book(s)

1. Abraham Silberschatz, Henry F.Korth and S.Sundarshan "Database System Concepts", Seventh Edition, McGraw Hill, 2019.

Reference Books

1. Ramez Elmasri and Shamkant Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education Delhi, 2017.
2. Raghu Ramakrishnan, ―Database Management Systems‖, Fourth Edition, McGrawHill College Publications, 2015.
3. Lee Chao, "Database Development and Management", Auerbach Publications, 1st edition, 2010.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

MCA I Year I Semester

24MCAP102 DATA STRUCTURES AND ALGORITHMS

L	T	P	C
3	1	0	4

Pre-requisite None

Course Description:

The course is intended to provide the foundations and practical implementation of Data Structures and algorithms. The primary objective is to ensure that the student evolves into a competent programmer capable of designing, analyzing and implementing the algorithms and data structures for different applications. Also, the student will be equipped with algorithm analysis techniques, the theory of reductions, and the classification of problems into complexity classes like NP.

Course Objectives:

This course enables students to

1. Understand the primary data structure and its applications
2. Identify advanced data structures in problem solving.
3. Analyze various algorithm complexity.
4. Illustrate various sorting and graph algorithms.
5. Apply specific problem-solving techniques in the appropriate application.

UNIT I LINEAR DATA STRUCTURES 12 hours

Need of good data structures and algorithms, Arrays, Stacks, Evaluation of Expressions, Infix to Postfix Conversion, - Queues, Priority Queue, Linked lists, Singly Linked List, Circularly Linked List, Doubly Linked lists

UNIT II NON-LINEAR DATA STRUCTURES 12 hours

Trees: Binary Tree, Binary Search Tree, Tree Traversal, AVL Trees, , Splay Tree, Red-Black Trees, B-trees, B+ Tree, Binary Heap, Skip List, Search and Update Operations on Skip Lists, Graphs: Terminology and Representations – Traversals.

UNIT III ALGORITHMS COMPLEXITY AND ANALYSIS 12 hours

The Role of Algorithms in Computing, analysing algorithms, Growth of functions, Asymptotic notation, recurrence relations, solving recurrence relations: substitution method, recursion-tree method, Master method, analysis of searching techniques: Binary Search.

UNIT IV SORTING AND GRAPH ALGORITHMS 12 hours

Quick Sort, Merge Sort, Heap Sort, Sorting in Linear Time: Counting Sort, Radix Sort- Minimum Spanning Trees (prims and Kruskal's algorithms), Shortest-path Algorithms: Dijkstra's and The Floyd-Warshall algorithm.

UNIT V PROBLEM-SOLVING METHODS AND APPROXIMATION ALGORITHMS **12 hours**

Dynamic Programming Methods: All pairs shortest paths, travelling salesman problem; Backtracking- N-queen problem, Graph coloring; Branch and Bound- Knapsack, Introduction to P, NP, NP-Hard and NP-Complete. NP-Completeness and Reducibility, Cook's Theorem without proof.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Understand the primary data structure and its implementation.
CO2: Identify and apply appropriate advanced data structures in problem-solving.
CO3: Analyze the complexity of various algorithms in terms of growth functions.
CO4: Implement sorting and shortest-path algorithms.
CO5: Apply algorithm design approaches with real-time applications.

Text Book(s)

1. Cormen, Thomas H., Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. Introduction to algorithms. MIT press, 2022.

2. Rajesh K. Shukla, *Data Structures using C & C++ : As per AICTE,* Wiley India publications, 2019

Reference Books

1. Alsuwaiyel, Muhammad H. *Algorithms: design techniques and analysis*. Vol. 15. World Scientific, 2021.

2. Sedgewick, Robert. An introduction to the analysis of algorithms. Pearson Education India, 2013.

3. McMillan, Michael. *Data structures and algorithms using C*. Cambridge University Press, 2007.

4. Storer, James Andrew. *An introduction to data structures and algorithms*. Springer Science & Business Media, 2012.

5. Soltys-Kulinicz, Michael. *Introduction to the Analysis of Algorithms, An*. World Scientific, 2018.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

MCA I Year I Semester

24MCAP103 PYTHON PROGRAMMING

L	T	P	C
3	1	0	4

Pre-requisite None

Course Description:

This course provides the students how to write programs in python language to perform different tasks in major concepts such as functions, collections, comprehensions, files, exception handling and Database Operations.

Course Objectives:

This course enables students to

1. Learn the basics of python programming such as variables, data types, operators, etc.
2. Understand the concept of Lambda and user defined functions
3. Examine the use of collections such as string, list, set, tuple, dictionary
4. Analyse the use of comprehensions and files
5. Review the concepts of exceptions and Database Operations

UNIT I FUNDAMENTALS 12 hours

History, Python-Interpreter, Keywords, Variables, Datatypes, Operators, Expressions, Input and Output functions, Type conversion functions, Indentations, Conditionals -if constructs, Loop Structures -For loop, While loop, break and continue statements, Modules, Packages and Libraries

UNIT II LAMBDA AND USER DEFINED FUNCTIONS 12 hours

Lambda functions, User Defined Function definition and function call, parameter passing, Pass and Return statements, Types of functions -Default arguments, Arbitrary arguments using *, Keyword arguments, Arbitrary Keyword arguments using **, Recursive functions, Local, nonlocal and Global variables.

UNIT III COLLECTIONS 12 hours

String operations and functions, Slicing and Indexing operations, format function, multiple inputs using split function, List operations and functions, Tuple operations and functions, Set operations and functions, Dictionary operations and functions, Array and its operations.

UNIT IV COMPREHENSIONS AND FILE HANDLING 12 hours

List comprehensions -for, for with if, for with if and else, nested comprehensions with for, Dictionary comprehensions, Dictionary comprehension with if, Set comprehensions, map, zip, filter and other related functions, File path, opening and closing files, reading and writing files, File position.

UNIT V EXCEPTION HANDLING AND DATABASE CONNECTIVITY 12 hours

Errors and Exceptions, Exception Handling, Multiple Exceptions, raise statement, User Defined Exceptions, Database connectivity - Python MySQL Module - Creating database, Creating tables, Insert, Read, and Update operations.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Write simple programs in python
CO2: Apply lambda and user defined functions
CO3: Develop programs in collections -string, list, set, tuple, dictionary
CO4: Implement programs using comprehensions and files
CO5: Apply exceptions and OOPS concepts in python applications

Text Book(s)

1. Programming with Python by Kyla Mcmullen, Elizabeth Matthews, June Jamrich Parsons, Cengage Learning 1st Edition 2024
2. Core Python Programming by Nageswara Rao R, Dreamtech Press,3rd edition, 2021

Reference Books

1. Learn Python Programming for Beginners by Flynn Fisher, Aron Chase, 2020
2. Python Programming Guide. Exploring Computer Programming by Sheetal Thakare, Fachbuch, 2020
3. Python: The Complete Reference by Martin C. Brown, McGraw Hill Education 2018

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

MCA I Year I Semester

24MCAP104 OPERATING SYSTEMS

L	T	P	C
3	1	0	4

Pre-requisite NIL

Course Description:

This course is designed to Explore the fundamental principles of operating systems, including process management, memory allocation, file systems, and advanced topics, through a condensed yet comprehensive five-unit syllabus.

Course Objectives:

This course enables students to

1. Understand the fundamental concepts, functions, and structure of modern operating systems.
2. Impart knowledge on process synchronization mechanisms, CPU scheduling algorithms, and strategies for handling deadlocks in operating systems.
3. Analyze memory management techniques and virtual memory concepts in operating systems.
4. Understand the fundamentals of disk management, RAID structures, and file-system implementation and management techniques in operating systems.
5. Assess the real time and mobile operating systems.

UNIT I INTRODUCTION TO OPERATING SYSTEMS 12 hours

Introduction to operating systems, Types of operating systems, Operating system services, System calls, Types of System calls, System Programs, Operating system operations, Process concepts, Process scheduling, Operations on Processes, Inter-process communication.

UNIT II PROCESS SYCHRONIZATION AND CPU SCHEDULING 12 hours

Process Synchronization: Background, The Critical-section problem, Semaphores, Classic Problems of Synchronization, Monitors, CPU Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Deadlocks: Deadlock Characterization, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT III MEMORY MANAGEMENT 12 hours

Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging Virtual Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames Thrashing

UNIT IV STORAGE MANAGEMENT 12 hours

Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure, File-System Interface: File Concept, Access Methods, File-System Mounting, File Sharing, Protection, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management.

UNIT V REAL TIME OPERATING SYSTEM 12 hours

Real-time operating systems, Multiprocessor and distributed operating systems, Mobile OS - Android vs IOS layered architecture, Cloud and IoT Operating Systems. Case studies: Analysing Linux and Windows operating systems.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Understand the key operating system concepts, services, system calls, process management, and inter-process communication.

CO2: Apply synchronization techniques, CPU scheduling algorithms, and manage deadlocks in operating systems.

CO3: Analyse memory management techniques such as segmentation, paging, and virtual memory concepts.

CO4: Implement RAID structures, and effectively handle file-system operations including file access, protection, and space allocation.

CO5: Evaluate and work with real time operating systems.

.

Text Book(s)

1. Avi Silberschatz ,Peter Baer Galvin, Greg Gagne, "Operating System Concepts", 10th edition, 2018. William Stallings, "Operating Systems: Internals and Design Principles", 9th edition,2022.

Reference Books (format change)

1. "Operating Systems Design and Implementation" 3rd edition by Andrew S. Tanenbaum and Albert S. Woodhull.2006.

2. "Operating Systems: Principles and Practice" 2nd edition by Thomas Anderson and Michael Dahlin .2014.

3 "Modern Operating Systems" Fourth edition by Andrew S. Tanenbaum and Herbert Bos 2001

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

MCA I Year I Semester

24MCAP201 DATABASE MANAGEMENT SYSTEMS LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite None

Course Description:

This course provides an executive understanding and approach to the technical subject of database management system.

Course Objectives:

This course enables students to

1. Explain DDL, DML,TCL and DCL Commands
2. Implement sub queries, any, all, in, exists, union, intersect and aggregate functions
3. Experiment PL/SQL functions, Procedure functions, Triggers and exceptions.

LIST OF EXPERIMENTS

1. Implementation of DDL commands of SQL with suitable examples
    a. Create table, Alter table, Drop Table
2. Implement DML and DCL Commands by using various examples.
3. QUERIES (ALONG WITH SUB QUERIES) USING ANY, ALL, IN, EXISTS, OTEXISTS, UNION, INTERSECT
4. QUERIES USING AGGREGATE FUNCTIONS (COUNT, SUM, AVG, MAX AND MIN) GROUP BY, HAVING and Creation and dropping of Views..
5. Consider the following schema for Order Database:
    a. SALESMAN(Salesman_id, Name, City, Commission)
    b. CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id)
    c. ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)
    d. Write SQL queries to
        1. Count the customers with grades above city's average.
        2. Find the name and numbers of all salesmen who had more than one customer.
        3. List all the salesmen and indicate those who have and do not have customers in their cities (Use UNION operation.)
        4. Create a view that finds the salesman who has the customer with the highest order of a day.
        5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.
6. Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old & new Salary.

    CUSTOMERS (ID, NAME, AGE, ADDRESS, SALARY)

7. Create cursor for Employee table & extract the values from the table. Declare the variables ,Open the cursor & extract the values from the cursor. Close the cursor.
    Employee(E_id, E_name, Age, Salary)
8. Write a PL/SQL block of code using parameterized Cursor, that will merge the data available

in the newly created table N_RollCall with the data available in the table O_RollCall. If the data in the first table already exist in the second table then that data should be skipped.

9. Implement functions, procedures in PL/SQL
10. Implement User defined and System defined exceptions.
11. **Mini Project:**

Each student has to implement any one of the following system

i. Employee management system
ii. Student Result information system
iii. Bank Management system
iv. Library information system
v. Hotel management system
vi. Railway reservation system

Note: Each system contains minimum of 6 tables. Each table contains minimum 10 rows.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Execute DDL, DML and DCL commands.
CO2: Implement PL/SQL procedures, functions, cursors, triggers and exceptions
CO3: Design Relational model for the given system

Text Book(s)

1. Benjamin Rosenzweig, Elena Silvestrova, ORACLE PL/SQL by example, Pearson Education,2023

2. Dr.P.S. Deshpande, SQL & PL/SQL for Oracle 11g, Black Book. Dreamtech Press, 2011

Reference Books

1. Rick F.Vander Lans, Introduction to SQL: Mastering the Relational Database Language, Pearson Education, 2006.

2. Steven Feuerstein with Bill Pribyl, Oracle PL/SQL Programming, O'Reilly Media, Inc. Sixth edition, 2014

3. N.Gehani, Database Book, The: Principles and Practice Using MySQL, Universities Press. 2008

Mode of Evaluation: Internal Practical Examination, External End Semester Practical Exam.

MCA I Year I Semester

24MCAP202 DATA STRUCTURES AND ALGORITHMS LABORATORY (USING C)

L	T	P	C
0	0	3	1.5

Pre-requisite None

Course Description:

This course introduces on the practical part of Data Structures and Algorithms using C language. This course allows students to implement linear and nonlinear data structures. It gives practical exposure for solving sorting and searching problems. Also, it enables to develop programs using various problem-solving methods.

Course Objectives:

This course enables students to

1. Implement Linear and Non-Linear Data structures.
2. Analyse different types of searching and sorting techniques.
3. Apply various problem-solving methods to real-time Applications

LIST OF EXPERIMENTS

1. Create a Stack and do the following operations.
    a. Push b. Pop c. Peep
2. Create a queue and do the following operations.
    a. Enqueue b. Dequeue c. Display
3. Write a program to convert from infix to postfix expression.
4. Implement the operations on the following data structures:
    a. singly linked list b. circular linked list c. doubly linked list
5. Implement the operations (insert, delete, search) on Binary Search tree.
6. Write a program on Tree Traversal
    a. Pre order b. In order c. Post order
7. Write a program to implement the following trees
    a. Splay Tree b. AVL Tree c. Red-Black Tree
8. Implement the following Divide and Conquer techniques.
    a. Binary search b. Quick sort c. Merge sort
9. Write a program to implement Heap sort for the given list of integer values.
10. Implement Graph traversals.
    a. BFS b. DFS
11. Write a program to find minimum spanning tree using
    a. Prim's method b. Kruskal's method.
12. Implement single source shortest path problem.
13. Implement all pairs shortest path problem.
14. Implement N-queen's problem using backtracking.
15. Write a program to find the solution for a knapsack problem using Branch and Bound

Course Outcomes:

After completion of the course the student will be able to

CO1: Implement Linear and Non-Linear Data structures.

CO2: Demonstrate sorting and searching techniques.

CO3: Apply various problem-solving techniques for complex problems.

Text Book(s)

1. Rajesh K. Shukla, Data Structures using C & C++ : As per AICTE, Wiley India publications, 2019

2. Cormen, Thomas H., Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. Introduction to algorithms. MIT press, 2022

Reference Books

1. Alsuwaiyel, Muhammad H. Algorithms: design techniques and analysis. Vol. 15. World Scientific, 2021.

2. Sedgewick, Robert. An introduction to the analysis of algorithms. Pearson Education India, 2013.

3. McMillan, Michael. Data structures and algorithms using C. Cambridge University Press, 2007.

Mode of Evaluation: External End Semester Practical Exam.

MCA I Year I Semester

24MCAP203 PYTHON PROGRAMMING LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite Any Programming Language

Course Description:

This course provides the students how to write programs in python language to perform different tasks in major concepts such as functions, collections, comprehensions, files, exception handling and Database Operations.

Course Objectives:

This course enables students to

1. Write algorithms and draw flowcharts using raptor tool for different computational problems
2. Develop Python programs using looping, decision making and user defined functions.
3. Implement Python programs using collections, comprehensions, files, exceptions and Database Operations

LIST OF EXPERIMENTS

SIMPLE PROGRAMS USING IF CONSTRUCTS AND CONTROL STRUCTURES

1.Draw flow charts for the following problems using Raptor Tool

a. To exchange/swap the values of two variables
b. To find factorial of a given number
c. To find the sum of set of numbers
d. To generate Fibonacci sequence
e. To reverse the digits of a number

2.Develop Python scripts for the following

a. To count and display the total number of prime numbers in given two ranges
b. To calculate the sum of digits of given N digit number
c. To generate Armstrong numbers
d. To check the given number for perfect or not
e. To find the factors of the given number

USING LAMBDA AND USER DEFINED FUNCTION

3.Develop Python scripts for the following using Lambda function

a. To create a lambda function that multiplies argument x with argument y
b. To filter, odd and even numbers
c. To square and cube every number in a given list
d. To extract year, month, date and time
e. To find palindromes in a given list of strings

4.Develop Python scripts for the following using User Defined Functions

a. To check the given number for Prime or not
b. To check the given number for odd or even
c. To calculate the length of given string
d. To count vowels in given string
e. To calculate the sum of all items in the given list

USING COLLECTIONS

5.Develop a Python script for String to calculate the length, to reverse, to count and display the Vowels, to remove spaces and to convert from lowercase to uppercase of the given string without using String built-in functions

6.Develop a Python script to implement slicing and indexing operations on String, List, Tuple, Set and Dictionary

7.Develop a Python script for List to sum all the items, to count the total number of items, to check the list is empty or not, to get the largest number and to shuffle & print the given list without using List built-in functions

8.Develop a Python script to implement the Set operations – Union, Difference, Intersection, All & any and Enumerate functions.

9.Develop Python scripts for Tuple to demonstrate packing & unpacking, to check for membership with in & not in operators and to concatenate more than one tuple into a single tuple

10.Develop a Python script for Dictionary to create & add items, to modify existing values using keys, to Update, to print values and to print keys

11.Develop a Python script by using Array to sort the array elements, to add given two matrix values and to transpose the given matrix

USING COMPREHENSIONS AND FILES

12.Develop Python scripts by using Comprehensions to print a list with if, to print a list with if-else, to print a list with nested comprehensions, to print Dictionary items with a condition using zip function and to print Set items

13.Develop a Python script to calculate individual student attendance percentage by using Files

USING EXCEPTION HANDLING AND DATABASE CONNECTIVITY

14.Develop a Python script to validate voting age by using Exceptions

15. Develop a Python script to implement database operations using student marks details.

Course Outcomes:

Upon successful completion of the course, students will be able to

1. Draw flow charts for different tasks using raptor tool
2. Write python basic programs using conditional, looping structures and functions
3. Develop python programs for collections, comprehensions, files, exceptions and Database Operations

Text Book(s)

1. Programming with Python by Kyla Mcmullen, Elizabeth Matthews, June Jamrich Parsons, Cengage Learning 1st Edition 2024
2. Core Python Programming by Nageswara Rao R, Dreamtech Press,3rd edition, 2021

Reference Book(s)

1. Learn Python Programming for Beginners by Flynn Fisher, Aron Chase, 2020
2. Python Programming Guide. Exploring Computer Programming by Sheetal Thakare, Fachbuch, 2020
3. Python: The Complete Reference by Martin C. Brown, McGraw Hill Education 2018

Mode of Evaluation: External End Semester Practical Exam.

MCA I Year II Semester

MCA I Year II Semester

24MCAP105 JAVA PROGRAMMING

L	T	P	C
3	1	0	4

Pre-requisite Problem Solving

Course Description:

This course introduces the core and advanced concepts of Java. It covers the core concepts of JVM architecture and OOPS concepts for building platform independent java applications. This course also deals with Implementation of Exception Handling, multi-threading in java programs. It also introduces the advanced concepts like Collections and Collection Framework

Course Objectives:

Students will be able to

1. Understand how to use Java to write Platform independent applications.
2. Analyze use of Java Classes and Objects, methods and constructors.
3. To Apply the concepts of Inheritance, Interfaces and Packages to build java programming.
4. Explore multi-threading, Java Collection Framework concepts.
5. Demonstrate JDBC Connections and execute SQL statements.

UNIT I INTRODUCTION TO JAVA 12 hours

The History of Java, Different versions, Java Virtual Machine Architecture-Class Loader-JRT, Java Buzzwords, Object Oriented Programming and its principles, Java Primitive Data types, Variables, Type Casting: Widening vs Narrowing.

Programming Constructs: Selection, Iteration and Jump Statements. Arrays, Jagged Arrays.

UNIT II CLASSES AND OBJECTS 12 hours

Class Fundamentals, declaring Objects, Introducing Methods, Constructors, this and super Keywords at Various Levels,Static keyword at various levels.

Method Over Loading, Method Overriding, using objects as parameters, Introducing Access Control, understanding static, introducing final, String vs String Buffer.

UNIT III PACKAGES& EXCEPTIONS 12 hours

Interfaces, Multiple Inheritance Issues, Packages and CLASSPATH, Access protection, importing packages, package example, Introducing to ***java. lang*** and ***java.io***packages.

Introduction, Exception handling fundamentals, Exception types, using try and catch, Multiple catch clauses, nested try statements, throw, throws, finally block, Java's Built-in-Exceptions, user defined exception.

UNIT IV MULTI-THREADING& JAVA COLLECTION FRAMEWORK. 12 hours

Multi-Threading: The Java Thread Model, Thread Life Cycle, the Main Thread, Creating a Thread, Multiple threads, Using isAlive(), join(), Thread Synchronization, Collection Framework,-Collection Hierarchy, Iterable Interface, List interface, Array List, Linked List, Vector, Stack, Queue, set

UNIT V JDBC: DATABASE DRIVERS AND CONNECTION MANAGEMENT **12 hours**

Type1: JDBC-ODBC driver, Type2: Native-API driver, Type3: Network-Protocol driver, Type4: Database-Protocol driver. **javax.sql package:** Connection management, Database access, Exceptions and Warnings, JDBC connectivity, Creating and executing SQL statements, prepared statement, Scrollable & Updatable resultset, javax.sql.DataSource Interface.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Understand the fundamentals of Java for problem solving.
CO2: Implement classes and method overloading concepts.
CO3: Develop user defined package by following security mechanisms
CO4: Implement multi-threaded applications and design applications using Collection Framework.
CO5: Implement JAVA applications using JDBC.

Text Book(s)

1. The Complete Reference Java, 9ed, Herbert Schildt, TMHProgramming in JAVA, Sachin Malhotra, Saurabh choudhary, Second Edition, Oxford
2. Advanced Java Dr.C.Muthu-Shalom Infotech

Reference Books

1. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Buyya, Selvi, Chu TMH
2. Core Java Volume 1. Fundamentals, 8ed, Cay S.Horstmann, Gray Cornell, Pearson
3. Advanced Java Programming uttam K.Roy-15 th Addition-Oxford Publications.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

MCA I Year II Semester

24MCAP106 COMPUTER NETWORKS AND SECURITY

L	T	P	C
3	1	0	4

Pre-requisite **None**

Course Description:

This course provides an introduction to computer networks, with a special focus on the Internet architecture and protocols. Topics include layered network architectures, addressing, naming, forwarding, routing, communication reliability, the client-server model, web and email protocols. Network security uses authentication, authorization, data encryption, and intrusion detection techniques. In comparison, cryptography uses encryption, decryption, digital signatures, and key management techniques.

Course Objectives:

This course enables students to

1. Acquire the knowledge in networking concepts and standards.
2. Understand network architectures of Data link layer and Network layer.
3. Analyze the function and design strategy of Transport layer and Application layer.
4. Learn to analyze the security of in-built cryptosystems.
5. Understand Network Layer Security and IPsec.

UNIT I NETWORK BASICS **12 hours**

Introduction- Network Types- Network Topologies- Networking Devices - Reference models: The OSI Reference Model- the TCP/IP Reference Model – Networks Standards - Transmission Media.

UNIT II DATA LINK LAYER & NETWORK LAYER **12 hours**

Introduction to data link layer: Framing-Sliding Window Protocol-Media Access Control-Wired LANs.

Introduction to Network Layer: IP Address Concepts – Switching: Circuit Switching and Packet Switching - Routing Algorithms: Distance vector (RIP), Link state (OSPF) and Path vector (BGP).

UNIT III TRANSPORT LAYER & APPLICATION LAYER **12 hours**

Transport layer protocols: Introduction – Services - Port number - User data gram protocol: UDP applications - Transmission control protocol: TCP services - World Wide Web: HTTPs, Electronic mail-Architecture - Domain Name System:

UNIT IV INTRODUCTION TO COMPUTER AND NETWORK SECURITY **12 hours**

Computer Security Concepts – The OSI Security Architecture – Security Attacks – Security Services and Mechanisms – A Model for Network Security – Classical encryption techniques: Substitution techniques, Transposition techniques, Steganography – Foundations of modern cryptography: Perfect security – Information Theory – Product Cryptosystem – Cryptanalysis.

UNIT V NETWORK LAYER SECURITY 12 hours

Introduction to Network Layer Security; IPSec Protocol - Security Associations (SAs) - Hashed Message Authentication Code (HMAC) - IP Authentication Header - IP ESP - Key Management Protocol for IPSec. Introduction: Cloud Security – Web Security – Wireless Security.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Understand the Basic Computer Networks Concepts.
CO2: Identify the needs of Data link layer and Network layer.
CO3: Learn the functionalities Transport layer and Application Layer.
CO4: Examine the networks security, threats and vulnerabilities.
CO5: Analyze the Network Layer Security aand IPSec.

Text Book(s)

1. Andrew S.Tannenbaum David J. Wetherall, "Computer Networks" Fifth Edition , Pearson Education 2022.
2. Behrouz A. Ferouzan, Debdeep Mukhopadhyay ―Cryptography & Network Security, 3rd edition, Tata McGraw Hill, 2021.

Reference Books

1. Douglas E. Comer, ―Internetworking with TCP/IP (Volume I) Principles, Protocols and Architecture, Sixth Edition, Pearson Education, 2013.
2. Forouzan, " Data Communication and Networking", Fifth Edition , TMH 2012.
3. William Stallings, ―Data and Computer Communications‖, Tenth Edition, Pearson Education, 2013
4. William Stallings "Network Security Essentials Applications and Standards", Pearson Education., 5th Edition, 2014.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

MCA I Year II Semester

24MCAP107 ARTIFICIAL INTELLIGENCE

L	T	P	C
3	1	0	4

Pre-requisite None

Course Description:

To understand the importance of AI techniques and its wide range of applications. The course is introduced with basics of AI along with the techniques and algorithms of AI. It also includes applications of AI and Tools of AI.

Course Objectives:

This course enables students to

1. Learn the fundamentals of Artificial Intelligence.
2. Understand the problem solving techniques of Artificial Intelligence.
3. Learn the basic types of logic and knowledge representation.
4. Explain NLP and its applications.
5. Examine various real time smart applications of various domains.

UNIT I INTRODUCTION TO AI 12 hours

AI: What is AI, Turing Test, Evolution of AI, Agents and Environment, Expert Systems, Knowledge representation and reasoning, Uncertain and probabilistic reasoning., Applications of AI.

UNIT II PROBLEM SOLVING IN AI 12 hours

Problem solving as a State Space searching strategies-BFS, DFS, Gaming Problem-Tic-Tac-Toe, Heuristic search techniques: Hill Climbing, Best First Search, Heuristic Functions, A* algorithm, AO* algorithm. Advanced search, Constraint satisfaction problems.

UNIT III KNOWLEDGE REPRESENTATION 12 hours

Propositional Logic: Representation, Inference, Reasoning Patterns, Resolution, Forward and Backward Chaining. First order Logic: Representation, Inference, Reasoning Patterns, Resolution, Forward and Backward Chaining.

UNIT IV NLP & CHATBOTS 12 hours

Natural Language Processing: Introduction, Natural Language Understanding, Components of NLP, Enterprise Applications, NLP Pipeline, NLP libraries, Challenges of NLP - Chatbots: Introduction, how to Build a Chatbot, Architecture of Chatbot, Challenges of building a Chatbot, Industry case studies - Virtual Assistants.

UNIT V SMART APPLICATIONS & AI TOOLS 12 hours

Smart Applications: Smart Manufacturing, Smart Agriculture, Smart Grids, Smart Transportation and Autonomous Vehicles, Smart Homes, Smart Cities.

AI Tools: ChatGPT, Veed, GitHub, Google Gemini, Quill Bot, Midjourney.

Course Outcomes:

Upon successful completion of the course, students will be able to

1. Demonstrate the basic concepts of AI and its applications
2. Illustrate the various AI algorithms
3. Analyze problem using suitable knowledge representation.
4. Implement the NLP based applications, Chatbots.
5. Design smart applications for various domains.

Text Book(s)

1. Elaine Rich and Kevin Knight, Artificial Intelligence, 2nd Edition, 2018.

2. Stuart J. Russell and Peter Norvig, Artificial Intelligence A Modern Approach 3. Joseph Howse, Prateek Joshi, Michael Beyeler - Opencv_ Computer Vision Projects with Python-Packt Publishing (2016)

Reference Books

1. Munesh Chandra Trivedi, A classical approach to Artificial Intelligence, Khanna Publications, 2018.

2. Tom Markiewicz & Josh Zheng, Getting started with Artificial Intelligence, Published by O'Reilly Media,2017.

3. Chandra S.S. & H.S. Anand, Artificial Intelligence and Machine Learning, PHI Publications, 2014.

4. Machine Learning, Rajiv Chopra, Khanna Publishing House, 2018.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

MCA I Year II Semester

24MCAP108 SOFTWARE ENGINEERING

L	T	P	C
3	1	0	4

Pre-requisite

Course Description:

This course aims to provide advanced knowledge and skills in software engineering principles, methodologies, and practices. It covers advanced topics such as software architecture, design patterns, software quality assurance, software testing, and emerging trends in software engineering. The course emphasizes both theoretical concepts and practical applications through projects, and hands-on exercises.

Course Objectives:

This course enables students to,

1. Understand software engineering principles and methodologies.
2. Analyse the various activities and approaches involved in requirement engineering, including elicitation, analysis, specification, and validation.
3. Explore the concept of software modelling and design patterns.
4. Learn advanced techniques for software quality and testing.
5. Analyse the software project management and estimation techniques

UNIT I SOFTWARE ENGINEERING CONCEPTS AND PROCESS MODELS **12 hours**

Defining Software, Software Application Domains, Legacy Software, The Software Process - software myths- -A layered technology– Software process models: A Generic Process Model- Prescriptive Process Models- The Unified Process

UNIT II REQUIREMENT ENGINEERING **12 hours**

Introduction: Characteristics Of a Good Requirement- Types of Software Requirements, Establishing The Groundwork, Requirements Elicitation, Developing Use Cases, Building The Requirements Model, Negotiating Requirements, Validating Requirements

UNIT III SOFTWARE MODELLING AND DESIGN **12 hours**

Requirements analysis, scenario-based modeling, developing an activity diagram, data modeling Concepts, Class-Based Modelling, Flow-Oriented Modeling, UML Diagrams, The Design Process, Design Concepts, The Design Model.

UNIT IV SOFTWARE TESTING AND MAINTENANCE **12 hours**

A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, White-Box Testing, Basis Path Testing-Control Structure Testing-Black Box Testing-Unit Testing — Integration Testing — Validation Testing - System Testing and Debugging-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.

UNIT V PROJECT MANAGEMENT 12 hours

Software Project Management: Project Management Concepts, Software Measurement Metrics for Software Quality, Software Project Estimation — LOC, FP Based Estimation, COCOMO I & II Model- Make/Buy Decision — Project Scheduling —Earned Value Analysis, Risk Management — Identification, Projection — Risk Management-Risk Identification-RMMM Plan-CASE TOOLS.

Course Outcomes:

Upon successful completion of the course students should be able to:

CO1: Understand the process to be followed in the software development life cycle
CO2: Analyze software requirements and their critical role in software engineering projects.
CO3: Implement various software modelling and design techniques
CO4: Differentiate the testing strategies and maintenance of the software project.
CO5: Analyze software project management and risk management techniques

Text Book(s)

1. Roger Pressman, Software Engineering - A Practitioner's Approach, 9th Edition, Tata McGraw Hill, 2023.

Reference Books

1. Richard Fairley, Software Engineering Concepts, Tata McGraw Hill, New India Edition, 2017.
2. Robert C. Martin, Agile Software Development, Principles, Patterns, and Practices Alan Apt Series, 2011.
3. Wendy Boggs and Michael Boggs, Mastering UML with Rational Rose, Wiley, 2009.
4. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.

Mode of Evaluation: Assignments, Mid-Term Tests, End Semester Examination.

MCA I Year II Semester

24MCAP204 JAVA PROGRAMMING LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite Nil

Course Description:

This course provides the students how to write programs in java language to perform different tasks in major concepts related to OOPS, Handling the Runtime Exceptions, working with String Classes, Creating Threads and implement applications using Multithreading Environment, Java Collection Framework, JDBC.

Course Objectives:

This course enables students to

1. Write basic Java Programs and implement oops concepts in java applications.
2. Read the User Input from various predefined classes and perform different operations on input data.
3. Develop User threads by handling runtime errors and establish Database connectivity.

LIST OF EXPERIMENTS

PROGRAMS ON DATA TYPES, CONDITIONAL STATEMENTS AND LOOPS

Exercise - 1

a) Write a JAVA program to display default value of all primitive data type of JAVA

b) write a java program to illustrate different types of java variables?

Excercise-2

Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 10 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

Excercise-3

a) Write a Java program for creating one base class for student personal details and inherit those details into the sub class of student educational details to display complete student information.

b) Write a java program to display the employee details using Scanner class.

PROGRAMS ON OBJECT ORIENTED CONCEPTS & JAVA STRING CLASSES.

Excercise-4

Write a java program to demonstrate Runtime polymorphism, using subclass and super class hierarchy and override superclass methods using parent child references.

Excercise-5

Write a program to create a class Student along with two method getData(),printData() to get the value through argument and display the data in printData. Create the two objects s1, s2 to declare and access the values from class STtest.

Excercise-6

a) Write a java program to illustrate character string handling methods for a given input string.

b) Write a Java program to reverse a string without using the reverse method of Java's String class

PROGRAMS ON EXCEPTIONS AND MULTI THREADING

Excercise-7

a) Write a java program to handle predefined exceptions in java?

b) Write a JAVA program to check a person is eligible for vote or not using user defined exception

Excercise-8

Write a JAVA program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea() that prints the area of the given Shape.

Excercise-9

a) Write a java program to create a java thread using extending Thread Class and Runnable Interface?

b) Write a java program in which thread sleep for 5 sec and change the name of thread

Excercise-10

Write a java program to solve producer consumer problem in which a producer produces a value and consumer consume the value before producer generate the next value.

PROGRAMS ON JAVA COLLECTIONS, DATA BASE CONNECTIVITY.

Excercise-11

Write a java program to create Array List for Student Courses and perform the following operations

i. Add ii. Access iii. Update iv. Delete

Excercise-12

Write a Java Program to Get Elements of a LinkedList and display on the console.

Excercise-13

Write a Java Program to get First, Last and Maximum element from the Vector.

Excercise-14

Write a Java Program to compare elements in a Collection List and display duplicate elements from the List.

Excercise-15

Write a java program that connects to a database using JDBC and perform the query processing operations

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Write the basic Java Programs and implement oops concepts in java applications.
CO2: Apply Exceptional handling techniques in JAVA applications
CO3: Develop multi-threaded applications and perform Query processing operations.

Text Book(s)

1. The Complete Reference Java, Herbert Scheldt, 13th Edition, Feb 2024

2. Core Java Volume I - Fundamentals, Pearson 12th Edition -December 2023

Reference Books

1. Programming with Java, E Balaguruswsmy,6th Edition, Mar2021

2. Java Programming Fundamentals, Premchand S Nair, CRC press-3rd edition, 2021

3. JAVA: A Beginner's Guide, Herbert Scheldt, Standard Edition

Mode of Evaluation: External End Semester Practical Exam.

MCA I Year II Semester

24MCAP205 COMPUTER NETWORKS AND SECURITY LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite NIL

Course Description:

The intention of Network Laboratory is to learn fundamental concepts related to networking. It is equipped with well-connected server and client structured systems to support the study of the concepts and protocols of networking and network security, anonymity and privacy, web security and applied cryptography for the effective implementation of the routing protocols.

Course Objectives:

This course enables students to

1. Learn network fundamentals and commands.
2. Examine various network protocols and security algorithms
3. Analyze the performance of digital signature Scheme and Penetration tools.

LIST OF EXPERIMENTS:

1. Study of different types of Network cables and practically implement the cross wired cable and straight through cable using crimping tool.
2. Study of basic network command and Network configuration commands using CISCO Routers and SWITCHES.
3. Write a HTTP web client program to download a web page using TCP sockets.
4. Simulation of DNS using UDP & TCP sockets.
5. Configure a Network using Distance Vector Routing protocol: RIP.
6. Configure Network using Link State Vector Routing protocol: OSPF, IS-IS.
7. Configure Network using Path Vector Routing protocol: BGP.
8. Perform encryption, decryption using the following substitution techniques.
   (i) Ceaser cipher, (ii) Play fair cipher iii) Hill Cipher iv) Vigenere cipher.
9. Configuration of the ISP-DNS server with host records and MX records so that any internet clients could reach the internet servers for HTTPs, FTP, POP3/IMAP and SMTP services.
10. Configure Site to Site IPsec VPN between two different locations.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Understand the network fundamentals and commands.
CO2: Apply various network protocols and security algorithms.
CO3: Demonstrate the performance of digital signature Scheme and Penetration tools.

Text Book(s)

1. Andrew S.Tannenbaum David J. Wetherall, “Computer Networks” Fifth Edition , Pearson Education 2022.
2. Behrouz A. Ferouzan, Debdeep Mukhopadhyay ―Cryptography & Network Security, 3rd edition, Tata McGraw Hill, 2021.

Reference Books

1. William Stallings, ―Data and Computer Communications‖, Tenth Edition, Pearson Education, 2013.
2. Douglas R. Stinson," Cryptography: Theory and Practice, Third Edition (Discrete Mathematics and Its Applications), Chapman & Hall/CRC, 2005.
3. William Stallings “Network Security Essentials Applications and Standards", Pearson Education., 5th Edition, 2014.

Mode of Evaluation: Mock Test, End Semester Examination.

MCA I Year II Semester

24MCAP206 ARTIFICIAL INTELLIGENCE LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite Nil

Course Description:

This course provides the students how to write programs in java language to perform different tasks in major concepts related to OOPS, Handling the Runtime Exceptions, working with String Classes, Creating Threads and implement applications using Multithreading Environment, how to implement Applets with GUI Components, JDBC, RMI.

Course Objectives:

This course enables students to

1. Explore the methods of implementing algorithms using artificial intelligence techniques
2. Illustrate search algorithms
3. Demonstrate building of intelligent agents.

LIST OF EXPERIMENTS

1. Introduction to AI libraries of Python.
2. Write a program to implement BFS.
3. Write a program to implement DFS.
4. Write a program to implement Tic-Tac-Toe game using Python.
5. Write a program to implement Hill Climbing Algorithm
6. Write a program to implement A* Algorithm
7. Write a program to implement AO* Algorithm
8. Write a program to implement 8 puzzle problem
9. Write a program to implement Water-Jug problem using Python.
10. Write a program to implement Towers of Hanoi problem
11. Build a Chatbot which provides all the information related to MITS college.
12. Build a virtual assistant for Wikipedia using Wolfram Alpha and Python

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Experiment the AI problem solving algorithms.

CO2: Implement Artificial Intelligence elementary Problems.

CO3: Design Chatbot and Virtual Assistant.

Text Book(s)

1. John Zelle, JimLeisy, *Python Programming – An Introduction to computer science*, Ingram , 3rd edition, 2016

2. Ashok Namdev Kamthane and Amit Ashok Kamthane, *Programming and Problem Solving with Python*, McGraw Hill Education; First edition, 2017.

Reference Books

1. Mark Lutz, *Programming Python*, O'Reilly, 3rd Edition, 2006.

2. Wesley J Chun, *Core Python Programming*, Pearson,3rd edition, 2012

3. Brain Draper, Python Programming: A Compatible Guide for Beginners to Master and Become an Expert in python programming Language, CreateSpace Independent Publishing Platform, 2016.

4 Build an AI Assistant with Wolfram Alpha and Wikipedia in Python. *https://medium.com/@salisuwy/build-an-ai-assistant-with-wolfram-alpha-andwikipedia-in-python-d9bc8ac838fe*

Mode of Evaluation: External End Semester Practical Exam.

DISCIPLINE ELECTIVES

Discipline Elective – I

24MCAP401 MACHINE LEARNING

L	T	P	C
4	0	0	4

Pre-requisite 24MATP101, 24MCAP102

Course Description:

This course provides a concise introduction to the fundamental concepts in machine learning and popular machine learning algorithms. This will cover the standard and most popular supervised learning algorithms including linear regression, logistic regression, decision trees, k-nearest neighbor, an introduction to Bayesian learning and the naïve Bayes algorithm, support vector machines and neural networks.

Course Objectives:

This course enables students to

1. Understand the basic concepts and applications of Machine Learning.
2. Explain the predictive models used in machine learning applications.
3. Analyse the classification model respect to real time problems.
4. Recognize the clustering models and Dimensional Reduction Techniques.
5. Experiment the hybrid models intend to increase the accuracy of ML based applications.

UNIT I INTRODUCTION **12 hours**

Learning – Designing a Learning System – Traditional Learning vs Machine Learning – Various types of Machine Learning – Machine Learning workflow – Machine Learning issues and challenges – Machine Learning Applications in real world problems.

UNIT II PREDICTIVE MODELS **12 hours**

Linear Regression Models – Least Squares, single multiple variables, Bayesian Linear Regression, mediant decent, linear classification Models– Discriminant Function –Perception Algorithm, Probabilistic Discriminative Model–Logistic Regressive

UNIT III CLASSIFICATION MODELS **12 hours**

Introduction – Different types of classifiers: Naive Bayes — Logistic Regression — Decision Tree - Support Vector Machine - K-Nearest Neighbour- Evaluation metrics for supervised learning – Issues and challenges – applications.

UNIT IV CLUSTERING MODELS **12 hours**

Partitioning based clustering – Hierarchical based clustering – Density based clustering – Grid based clustering – Mixture Models and EM Algorithm -Evaluation metrics for clustering models - Dimensional Reduction Techniques: PCA – ICA – LDA.

UNIT V ENSEMBLE LEARNING 12 hours

Boosting – AdaBoost Algorithm – Bagging – Random Forest – NoFree-Lunch Theorem – XGBoost Algorithm – Stacking – Voting – Ensemble Diversity – Error Decomposition – Diversity Measures – Evaluating Ensembles of Classifiers.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Understand the real-world applications that needs machine learning based solutions.
CO2: Examine the predictive machine learning Models.
CO3: Experiment the Classification algorithms in appropriate real-time applications
CO4: Implement the Clustering algorithms for real world problems.
CO5: Apply Ensemble Learning Modes for Real Time Predictions

Text Book(s)

1. Aurelien Geron, Hands on Machine Learning with Scikit -Learn , Keras and Tensor Flow Concepts, Tools and Techniques to build intelligent Systems,2nd Edition by O'Reilly Media Publishers, 2019.
2. Tom Michel , "Machine Learning", Mc.Graw Hill, Indian Edition, 1997.

Reference Books

1. Ethem Alpaydin, Introduction to Machine Learning, 4th edition, MIT Press 2020.

2. Bishop, Christopher M., Pattern Recognition and Machine Learning. Springer-Verlag, 2006.

3. Zhi-Hua Zhou, Ensemble Methods: Foundations and Algorithms, CRC Press, 2012

4. Lior Rokach, Ensemble Learning: Pattern Classification using Ensemble Methods, 2nd ed., World Scientific, 2019.
5. Tom M. Mitchell, Machine Learning, McGraw-Hill Education (India) Private Limited, 2013

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Discipline Elective – I

24MCAP402 MICRO CONTROLLERS AND EMBEDDED SYSTEMS

L	T	P	C
4	0	0	4

Pre-requisite None

Course Description:

This Course Provide tremendous number of applications for embedded computing and Internet of things (IOT) has given rise to high demand for engineers with experience in designing and implementing embedded systems with microcontroller. This course is designed to provide an introduction to microcontroller architecture and Interfacing, embedded Devices (ARDUINO, RASPBERRY Pi) and Sensors Applications.

Course Objectives:

This course enables students to

1. To learn the architecture and pin configuration of 8051 Micro Controller
2. To Understand the Interfacing of 8051 Microcontroller.
3. To Learn the Architecture of ARDUINO Board
4. To learn the architecture of RASPBERRY PI
5. To Understand the Sensors and its Applications.

UNIT I MICROCONTROLLER 12 hours

Architecture of 8051 – Special Function Registers(SFRs) – I/O Pins Ports and Circuits – Instruction set – Addressing modes – Assembly language programming

UNIT II INTERFACING MICROCONTROLLER 12 hours

Programming 8051 Timers – Serial Port Programming – Interrupts Programming – LCD & Keyboard Interfacing – ADC, DAC & Sensor Interfacing – External Memory Interface- Stepper Motor and Waveform generation.

UNIT III EMBEDDED DEVICES I (ARDUINO) 12 hours

Embedded Computing Basics; System-on-Chips; Choosing Your Platform; Arduino; Developing on the Arduino; Some Notes on the Hardware; Openness;

UNIT IV UNIT III EMBEDDED DEVICES – II (RASPBERRY PI) 12 hours

Raspberry Pi; Cases and Extension Boards; Developing on the Raspberry Pi; Some Notes on the Hardware; Openness; Other notable platforms; Mobile phones and tablets; Plug Computing: Always-on Internet of Things.

UNIT V SENSORS & APPLICATIONS 12 hours

Introduction to sensors and Need for sensors in the modern world- Static and dynamic characteristics of sensors – Types of sensors-Sensors Applications-Home Appliance Sensors, Medical Diagnostic Sensors, Sensors for Manufacturing, Sensors for environmental Monitoring

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: To Understand the architecture and pin configuration of 8051 Micro Controller
CO2: To implement the interfacing of 8051 Micro Controller.
CO3: To analyse the Architecture of Arduino board.
CO4: To Examine the Architecture of the RASPBERRY PI board.
CO5: To implement the Sensors in real-time Applications

Text Book(s)

1. Krishna Kant, "Microprocessors and Microcontrollers", Prentice Hall of India, 2021.

2. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahendra Swain "Internet of Things with Raspberry Pi and Arduino" CRC Press.2020.

Reference Books

1. Mohamed Ali Mazzini, Janice Gillispie Mazidi, Rolin Mc Kinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011.

2. Patranabis-Sensors and Actuators- 2nd Ed., PHI, 2013.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Discipline Elective – I

24MCAP403 AGILE METHODOLOGIES

L	T	P	C
4	0	0	4

Pre-requisite

Course Description:

This course aims to provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software. It also provides a good understanding of software design and a set of software technologies and APIs.

Course Objectives:

This course enables students to

1. Explain the object-oriented techniques used in the real-world software industries
2. Provide students with a theoretical as well as practical understanding of agile software development practices.
3. Understand the software design, technologies and APIs.
4. Examine and demonstrate the agile development environment and its testing techniques.
5. Improve workflows and speed up deployment.

UNIT I INTRODUCTION TO OBJECT ORIENTED ANALYSIS 12 hours

Introduction: SDLC & its variations, Approaches to system development, SSAD, OOAD, Unified Process and its characteristics, Unified Process life cycle, Basics of Object Orientation- OO development and its themes; Modelling and usefulness of OO development

UNIT II AGILE FUNDAMENTALS 12 hours

Introduction to Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values.

UNIT III AGILE PROCESSES 12 hours

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices

UNIT IV AGILITY AND KNOWLEDGE MANAGEMENT 12 hours

Agile Information Systems – Agile Decision Making –Development, Acquisition, Refinement, Distribution, Deployment, Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM)

UNIT V INTRODUCTION TO DEVOPS 12 hours

Continuous Delivery, The Principles of Flow Feedback Continual Learning and Experimentation. Selecting which value stream to start with Understanding the Work in our value stream Making it visible Expanding - Design Organization and architecture Outcomes by Integrating Operations.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Analyse the object-oriented techniques.
CO2: Understand the Agile software development processes
CO3: Perform iterative software development processes: how to plan them, how to execute them
CO4: Review the impact of social aspects on software development success
CO5: To analyse DevOps and its relationship with agile development.

Text Book(s)

1. Konnor Cluster, "Agile Project Management: Learn How To Manage a Project With Agile Methods, Scrum, Kanban and Extreme Programming", Independently Published, 2019.

Reference Books

1. Craig Larman, "Agile and Iterative Development: A Manager's Guide", Pearson Education, Second Impression, 2007

2. Object Oriented Analysis and Design with Applications by Grady Booch Robert, Third Edition, 2009.

3. Shore, James. The Art of Agile Development: Pragmatic guide to agile software development. "O' Reilly Media, Inc.", 2007.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Discipline Elective – I

24MCAP404 COMPUTER GRAPHICS AND MULTIMEDIA

L	T	P	C
4	0	0	4

Pre-requisite

Course Description:

This course familiarizes the students with fundamental algorithms that are used in interactive graphics systems. The students will learn algorithms and techniques of fundamental 3D computer graphics and understand the relationship between the 2D and 3D versions of such algorithms. This course will benefit the students to apply these algorithms and techniques in upcoming real-world scenarios.

Course Objectives:

This course enables the students to,

1. Grasp the basic concepts of various display devices and graphics algorithms for line, circle, and polygon drawing.
2. Acquire knowledge of various 2-D and 3-D transformation techniques including translation, rotation, scaling, shearing, and reflection.
3. Know the concepts of windowing and clipping in 2-D and 3-D graphics.
4. Learn about the characteristics, uses, and components of multimedia systems.
5. Understand the principles and uses of animation in computer graphics and compression techniques.

UNIT I INTRODUCTION 12 hours

Introduction to Raster Scan displays, Pixels, Frame buffer, Vector & Character generation, Random Scan systems, Display devices, Scan Conversion techniques, **Line Drawing:** simple DDA, Bresenham's Algorithm, **Circle Drawing Algorithms:** Midpoint Circle drawing and Bresenham's Algorithm, **Polygon fill algorithm:** Boundary-fill and Flood-fill algorithms

UNIT II 2-D TRANSFORMATION 12 hours

2-D Transformation: Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogenous coordinate system, Matrices Transformation, Composite Transformation. **Windowing & Clipping:** World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping & Polygon Clipping Algorithms.

UNIT III 3-D TRANSFORMATIONS 12 hours

3-D Transformations: Translation, Rotation and Scaling. **Parallel & Perspective Projection:** Types of Parallel & Perspective Projection, **Hidden Surface elimination:** Depth comparison, Back face detection algorithm, Painter's Algorithm, Z-Buffer Algorithm. **Basic Illumination Model:** Diffuse reflection, Specular reflection, Phong Shading, Gouraud shading, Ray Tracing, Color models like RGB, YIQ, CMY, HSV.

UNIT IV MULTIMEDIA 12 hours

Multimedia: Characteristics of a multimedia presentation, Uses of Multimedia, Text –Types, Unicode Standard, text Compression, Text file formats, Audio Components of an audio system, Digital Audio, Digital Audio processing, Sound cards, Audio file formats, Audio Processing software, Video-Video color spaces, Digital Video, Digital Video processing, Video file formats.

UNIT V ANIMATION 12 hours

Animation: Uses of Animation, Principles of Animation, Computer based animation, 3D Animation, Animation file formats, Animation software's. **Compression:** Lossless/Lossy Compression techniques, Image, Audio & Video Compressions, MPEG Standards, Multimedia Architecture, Multimedia databases

Course Outcomes:

Upon successful completion of the course students should be able to:

CO1: Demonstrate Knowledge of Display Technologies.
CO2: Apply 2-D and 3-D Transformations to Perform 2-D transformations such as translation, rotation, scaling, shearing, and reflection and Implement 3-D transformations.
CO3: Implement Windowing and Clipping Algorithms and understand Projections and Hidden Surface Elimination.
CO4: Analyze and Process the Multimedia Data.
CO5: Apply compression techniques in image processing

Text Book(s)

1. Peter Shirley, Michael Ashikhmin, Steve Marschner, et al, Fundamentals of Computer Graphics, 5th Edition, 2022

2. Donald Hearn and M.P. Becker "Computer Graphics" Pearson Pub, 4th Edition, 2015

3. Andleigh, P. K and Kiran Thakrar, Multimedia Systems and Design, PHI, 1st Edition, 2015.

Reference Books

1. Parekh "Principles of Multimedia" McGraw Hill Education, 2nd edition, 2017

2. Maurya, "Computer Graphics with Virtual Reality System " , Wiley India, 2018

3. Pakhira,"Computer Graphics ,Multimedia &Animation",PHI learning, 2010

4. Andleigh, Thakral , "Multimedia System Design " PHI Learning, 2011

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Discipline Elective – I

24MCAP405 IMAGE PROCESSING

L	T	P	C
4	0	0	4

Pre-requisite None

Course Description:

This course provides a comprehensive introduction to digital image processing, focusing on foundational principles and practical applications. Students will learn to understand and differentiate key image enhancement techniques, analyze various image processing methods, and explore cutting-edge technologies shaping the field today. Emphasizing real-world applications, the course equips students with the skills to apply image processing techniques across diverse domains, from medical imaging and industrial inspection to multimedia and beyond.

Course Objectives:

This course enables students to

1. Understand the basic concepts of digital image processing.
2. Differentiate the image enhancement techniques.
3. Analyze the various image processing techniques and their applications.
4. Explore the use of current technologies in image processing systems.
5. Apply real world applications of image processing

UNIT I FUNDAMENTALS OF IMAGE PROCESSING 12 hours

Introduction – Types and Applications of image processing – Steps in image processing applications – Digital imaging system – Sampling and quantization – Pixel connectivity – Distance measures – Color fundamentals and models – File formats – Image operations

UNIT II IMAGE ENHANCEMENT 12 hours

Image Transforms: Discrete Fourier Transform – Fast Fourier Transform – Discrete Cosine Transform – Image Enhancement in Spatial and Frequency Domain – Grey Level Transformations – Histogram Processing –Spatial Filtering – Smoothing And Sharpening –Frequency Domain: Filtering in Frequency Domain.

UNIT III IMAGE RESTORATION AND MULTI-RESOLUTION ANALYSIS 12 hours

Multi Resolution Analysis: Image Pyramids – Multi Resolution Expansion – Wavelet Transforms – Image Restoration – Image Degradation Model – Noise Modelling – Blur – Order Statistic Filters – Image Restoration Algorithms.

UNIT IV IMAGE SEGMENTATION AND FEATURE EXTRACTION 12 hours

Image Segmentation – Detection of Discontinuities –Edge Operators –Edge Linking and Boundary Detection – Thresholding – Region based Segmentation – Image Features and Extraction – Image Features – Types of Features – Feature Extraction – SIFT, SURF and Texture – Feature Reduction Algorithms

UNIT V IMAGE PROCESSING ALGORITHMS 12 hours

Image Classifiers – Supervised Learning – Support Vector Machines, Image Clustering – Unsupervised Learning – Hierarchical and Partition based Clustering Algorithms – EM Algorithm. Note: Specific Algorithm(Supervised & Unsupervised, Applications)

Course Outcomes:

After completion of the course, students will be able to

1. Understand basic image processing operations.
2. Apply new techniques in the areas of image enhancement and restoration.
3. Analyze various image segmentation algorithms.
4. Extract features from images by using classifiers and clustering algorithms.
5. Design image processing application that uses different concepts of image processing.

Text Book(s)

1. Rafael C. Gonzalez, Richard Eugene Woods, “Digital Image Processing”, Pearson Education, 2018.
2. Milan Sonka, Vaclav Hlavac, Roger Boyle, “Image Processing Analysis and Machine Vision”, Fourth Edition, Cengage India, 2017.

Reference Books

1. S. Sridhar, “Digital Image Processing”, Second Edition, Oxford University Press, 2016.
2. Anil K. Jain, “Fundamentals of Digital Image Processing”, PHI, 2011.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Discipline Elective – I

22MCAP406 BLOCKCHAIN TECHNOLOGY

L	T	P	C
4	0	0	4

Pre-requisite None

Course Description:

Blockchain is an emerging technology for developing decentralized applications and data can be stored in a secured environment. Beyond its role, an underlying technology of cryptocurrencies. The basic principle of this technology is one can create a distributed and replicated ledger of events, transactions and data generation with strong cryptographic guarantees. Documents stored in this environment are tamper proof, immutable and easily verifiable. Blockchain technology is implemented not only in cryptocurrencies also in healthcare, finance, e-governance, real-estate and IoT.

Course Objectives:

This course enables students to

1. Understand the basic security structure of a blockchain technology
2. Analyze the blockchain based system and why/when it is better than a simple distributed database
3. Identify that where blockchain technology may be applied with its potential and its advantages, and types
4. Recognize Consensus and Cryptocurrency, and its legal implications in various domains.
5. Identify new challenges that exist in monetizing businesses around blockchain technology and smart contracts

UNIT I CRYPTOGRAPHY AND HASHING FUNCTION 12 hours

Overview of cryptography- Symmetric-key Encryption - Asymmetric key encryption - Message integrity- Hash Algorithm-SHA-Digital signatures- Identification protocols in Cryptography-SSL/TLS - Zero knowledge protocols.

UNIT II DISTRIBUTED ENVIRONMENT 12 hours

Distributed Network - Distributed Database, P2P Network - Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance.

UNIT III BLOCKCHAIN 12 hours

Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Wallet – Blocks, Merkle Tree, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Types of Blockchain

UNIT IV CONSENSUS AND CRYPTOCURRENCY 12 hours

Consensus: Distributed consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Namecoin.

UNIT V ETHEREUM AND BLOCKCHAIN APPLICATIONS 12 hours

Ethereum: - Ethereum - Construction, Ethereum Virtual Machine (EVM) - Wallets for Ethereum - Solidity - Smart Contracts - some attacks on smart contracts. Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Explain the usage of cryptography and hashing techniques in Blockchain technology.

CO2: Explain the functional model of distributed network environment.

CO3: Describe the basic building blocks of Blockchain types and transactions.

CO4: Interpret consensus & cryptocurrencies and describe differences between proof-of-work and proof of-stake consensus.

CO5: Discover ethereum based smart contracts and blockchain based applications.

Text Book(s)

1. Jonathan Katz and Yehuda Lindell "Introduction to Modern Cryptography" (2nd edition)-CRC Press-by Taylor & Francis Group,2014.

2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press, 2016.

Reference Books

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies, 2014

2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System,2008

3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger, "Yellow paper, 2014.

4. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts,2017

5. Dan Boneh and Victor Shoup, "A graduate course in Applied Cryptography" - Version 0.4, 2017.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Discipline Elective – I

24MCAP407 XML AND WEB SERVICES

L	T	P	C
4	0	0	4

Pre-requisite

Course Description:

This course provides the concepts of XML, service - oriented architecture and web service components. Also, web service tools and how to implement web services in e-business through its frameworks with mobile devices.

Course Objectives:

This course enables students to

1. Learn the fundamentals of XML technology
2. Understand the concepts of service-oriented architecture
3. Examine the web service components and protocols
4. Determine the XML framework components
5. Analyse the XML and web services in e-business

UNIT I XML TECHNOLOGY 12 hours

Introduction to XML – benefits – Advantages of XML over HTML – EDL –Databases – XML based standards – DTD –XML Schemas – X- Files – XML processing – DOM –SAX presentation technologies – XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH –XQ

UNIT II ARCHITECTING WEB SERVICES 12 hours

Business motivations for web services – B2B – B2C- Technical motivations – limitations of CORBA and DCOM – Service Oriented Architecture – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime

UNIT III WEB SERVICES BUILDING BLOCK 12 hours

Transport protocols for web services – messaging with web services – protocols – SOAP – describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI- Web service inspection – Ad-Hoc Discovery – Securing web services.

UNIT IV XML AND CONTENT MANAGEMENT 12 hours

Semantic Web – Role of Meta data in web content – Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG –WSFL.

UNIT V IMPLEMENTING XML IN E-BUSINESS 12 hours

B2B - B2C Applications – Different types of B2B interaction – Components of e-business XML systems – eb-XML – Rosetta Net Applied XML in vertical industry – Web services for mobile devices

Course Outcomes:

Upon successful completion of the course, students will be able to
CO1: Understand the XML terminologies.
CO2: Explain the service-oriented architecture.
CO3: Apply web service protocols.
CO4: Understand XML content management
CO5: Implement XML and web services in e-business.

Text Book(s)

1. Ron schmelzer., et al, "XML and Web Services", Pearson Education, 2002

2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004

Reference Books

1. Henry Bequet and Meeraj Kunnumpurath, "Beginning Java Web Services", Apress, 2004

2. Russ Basiura and Mike Batongbacal, "Professional ASP.NET Web Services", Apress, 2003.

3. R. Nagappan, R. Skoczylas, R.P. Sriganesh, Developing Java Web Services, , Wiley India,2008.

4. Eric Newcomer and Greg Lomow, Understanding SQA with Web Services, Pearson,2009

5. James McGovern, Sameer Tyagi et.al., Java Web Service Architecture, Elsevier,2009.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Discipline Elective – I

24MCAP408 CYBER SECURITY

L	T	P	C
4	0	0	4

Pre-requisite 24MCAP106, 24MCAP205

Course Description:

Cyber-attacks, types of cybercrime, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks. Interpret and forensically investigate security incidents. Apply policies and procedures to manage Privacy issues.

Course Objectives:

This course enables students to

1. Understand cyber security concepts.
2. Learn cyber laws & concepts of cyber forensics.
3. Study the defensive techniques and privacy methods.
4. Understand cybercrime framework and methodologies
5. Learn firewall methods and use case.

UNIT I INTRODUCTION 12 hours

Introduction to Cyber Security: Basic Cyber Security Concepts, Layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, Motive of attackers, Types of Attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, Comprehensive Cyber Security Policy.

UNIT II CYBERSPACE 12 hours

Cyberspace and Law**:** Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy, Cyber Forensics: Historical background of Cyber forensics - The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics.

UNIT III PRIVACY 12 hours

Privacy Concepts - Privacy principles and policies - Authentication and Privacy - Privacy on the Web - Email-Security - Privacy Impacts of Emerging technologies: Electronic Voting - Cyber Warfare - Privacy Issue, Data Privacy Attacks, Data linking and profiling, privacy policies and specifications, privacy policy languages - Privacy in different domains: Medical, Financial and Educational.

UNIT IV CYBERCRIME 12 hours

Introduction Cybercrime, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile device.

UNIT V FIREWALL 12 hours

Introduction to network Firewall - Design of Firewalls - Types of Firewalls - Comparison of Firewall types - Example firewall configurations - Network Address Translation (NAT) - Network Defence tools. Firewalls and Packet Filters - Firewall policy - Stateless Vs Stateful Firewalls - Port Forwarding – Case study Firewall Implementation.

Course Outcomes:

CO1: Explain fundamentals of networks security, security architecture, threats and vulnerabilities
CO2: Classify cyber laws and various methodologies in cyber forensics.
CO3: Analyse the basics of cybercrime and computer forensics.
CO4: Differentiate the Privacy and Security issues.
CO5: Implement firewall case to enterprise network.

Text Book(s)

1. William Stallings, "Cryptography and Network Security - Principles and Practice", Seventh Edition, Pearson Education, 2017.
2. Nina Godbole, Sunit Belapure, “Cyber Security: Understanding Cybercrimes, Computer Forensics and Legal Perspectives”, First Edition, Wiley India, 2011.

Reference Books

1. Behrouz A. Ferouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata Mc Graw Hill, 2015.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.
3. David Kim, Michael G. Solomon, “Fundamentals of Information Systems Security”, Jones & Bartlett Learning Publishers, 2013.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Discipline Elective – I

24MCAP409 CLOUD COMPUTING

L	T	P	C
4	0	0	4

Pre-requisite None

Course Description:
This course describes what is Cloud and the various service delivery models of a Cloud computing architecture, followed by the Cloud management, Performance issues, Hard ware concepts, Storage, Security and Privacy issues.

Course Objectives:
Student will be able to

1. Understand the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability benefits, as well as current and future challenges.
2. Learn the basic ideas and principles in data centre design, cloud management techniques, and cloud software deployment considerations.
3. Study performance metrics across compute, network and storage resources with Cloud delivery and hosting models.
4. Focuses on how to create virtualized storage, access and provisioning Models
5. Understand the Security model in cloud computing.

UNIT I UNDERSTANDING CLOUD COMPUTING 12 hours

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Cloud Services

UNIT II DEVELOPING CLOUD SERVICES 12 hours

Types of Cloud Service Development – Software as a Service – Platform as a Service – Infrastructure as a Service (IaaS)-Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

UNIT III CLOUD COMPUTING FOR EVERYONE 12 hours

Centralizing Email Communications – Cloud Deployment Models- Collaborating on Schedules – Collaborating on To-Do Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events.

UNIT IV PROGRAMMING MODEL 12 hours

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Aneka, Cloud Sim.

UNIT V SECURITY IN THE CLOUD 12 hours

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

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Understand the cloud computing Paradigms and Architecture of Cloud.

CO2: Design different workflows according to cloud services requirements and apply real time applications.

CO3: Analyse the various programming schedule of cloud computing and apply them to solve Problems.

CO4: Implement the different Programming Model using cloud computing tools.

CO5: Assess the legal issues and security risks related cloud resources.

Text Book(s)

1. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, August 2022.

2. Cloud Native Architectures, Tom Laszewski, Kamal Arora Erik Farr, Pivum Zonooz, Packt publishing, August 2018

Reference Books

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2022.
2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2019.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2023.
4. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India, 2019.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly , 2022

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Skill Enhancement Course

Skill Enhancement Course – I

24ENGP601 CORPORATE COMMUNICATION

L	T	P	C
2	0	2	3

Pre-requisite **None**

Course Description:

Course Description: English is practical and it is a must for any institution to provide students with opportunities to indulge in actively applying their language skills. Thus, the Communication Skills Lab facilitates students with adequate opportunities to put their communication skills in use. It also accommodates peer learning by engaging students in various interactive sessions. This lab will be accompanied by a practical lab component.

Course Objectives:

This course enables students able to

1. Focus on their interactive skills
2. Develop their communicative competency
3. Fortify their employability skills
4. Empower their confidence and overcome their shyness

UNIT I LISTENING AND SPEAKING SKILLS 9 hours

Listening/watching interviews, conversations, documentaries, etc.; Listening to lectures, discussions from TV/Radio/Podcast. Conversational skills (Formal and Informal); Group Discussion; Making effective Power Point presentations.

UNIT II READING AND WRITING SKILLS 9 hours

Reading different genres of texts including newspapers Magazines: creative writing; Writing job applications and resume; Emails; Letters; Memorandum; Reports; Writing abstracts and summaries; Interpreting visual texts.

UNIT III ACCLIMATIZING STUDENTS TO OTHER EXAMS 9 hours

Test of English as a Foreign Language (TOEFL); International English language Testing System (IELTS): Civil Service Examinations; Verbal--ability.

UNIT IV INTERVIEW SKILLS 9 hours

Different types of interviews: Answering questions and offering information; Mock interviews; Body Language; Articulation of sounds; Word Stress, Sentence Stress and Intonation.

Course Outcomes:

Upon successful completion of the course, students will be able to

1. Read articles from magazines and newspapers
2. Participate effectively in informal conversations
3. Introduce themselves and their friends and express opinions in English
4. Comprehend conversations and short talks delivered in English
5. Write short essays of a general kind, draft Reports and personal letters and emails in English.

Text Book(s)

1. Sanjay Kumar and PushpLata; Communication Skills; Oxford University Press, 2012.

2. Sabina Pillai and Agna Fernandez; Soft Skills and Employability Skills;Cambridge University Press, 2018.

3. S.P. Dhanavel; English and Communication Skills for Students of Science and Engineering; Orient Blackswan, 2009

4 M. Ashraf Rizvi; Effective Technical Communication; Tata Mc Graw Hill Co. ltd, 2005.

Reference Books

1. Dr.M.Adithan; *Study Skills for Professional Students in Higher Education*; S.Chand& Co. Pvt., 2014.

2. Guy Brook Hart & Vanessa Jakeman; *Complete IELTS*: Cambridge University Press, 2014.

3. Vanessa Jakeman& Clare Mcdowell; *Action Plan for IELTS:* Cambridge University Press, 2006.

4. Guy Brook Hart; *Instant IELTS*;Cambridge University Press, 2004

5. S.P.Bakshi&Richa Sharma; *Descriptive General English;*Arihant Publications, 2012.

6. Charles Browne, Brent Culligan 7 Joseph Phillips; *In Focus (level 2);* Cambridge University Press.

7. Steven Gershon; *Present Yourself 2* (second edition); Cambridge University Press.

8. Leo Jones; *Let's Talk 3*(second edition); Cambridge University Press.

9. Nutall J. C.; *Reading Comprehension*; Orient Blackswan.

10. *www.cambridgeenglish.org/in/*

11. https://learnenglish.britishcouncil.org/en/english-grammar

12. https://www.rong-chang.com/

Mode of Evaluation: Formative assessment.

Skill Enhancement Course – II

24MCAP601 FRONTEND WEB DEVELOPMENT

L	T	P	C
2	0	2	3

Pre-requisite **None**

Course Description:

To understand the basics of frontend web development including HTML, CSS and JavaScript. the students can update their knowledge on technologies. This will help the students to learn the complete set of process-like designing, development and deployment.

Course Objectives:

This course enables students to

1. Understand the Fundamentals of HTML web pages.
2. Apply CSS Styling Techniques, and properties to style web pages effectively, including color manipulation, font styling, and element positioning.
3. Familiarize web page with validation using JavaScript
4. Understand different DOMs and event handling mechanisms.
5. Understand and practice embedded dynamic scripting on client-side Internet

UNIT I UI DESIGN 9 hours

HTML Introduction - Basics- Elements- Attributes- Headings- Paragraph- Tables- Formatting- Links and Images - Lists- Blocks- Layout -Responsive - IFrames -Forms – Form Elements- Introduction to HTML5

1. Write a program to implement Formatting text in HTML (font, color, Heading, Background color)
2. Write a program to Create a Table in HTML.
3. Create Registration Form using HTML Form elements.
4. Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to show remarks.

UNIT II CASCADING STYLE SHEET 9 hours

Cascading Style Sheet (CSS3): The need for CSS – Basic syntax and structure Inline Styles – Embedding Style Sheets - Linking External Style Sheets - Introduction to CSS3 – Backgrounds - Manipulating text - Margins and Padding - Positioning using CSS - Responsive Web Design - Introduction to LESS/SASS

Add Styles to your Resume using CSS 3 Properties.

1. Write CSS for Fonts, Background, Color, Text
2. Add External, Internal and Inline CSS styles to know the priority.
3. Write an HTML page that contains a selection box with a list of 5 countries, when the user selects a country, its capital should be printed next to the list; Add CSS to customize the properties of the font of the capital (color, bold and font size)

UNIT III OVERVIEW OF JAVASCRIPT 9 hours

Introduction - Core features - Data types and Variables - Operators, Expressions, and Conditional Statements (if, if-else, if-else-if-else), switch-case, loops, (while, for, do-while), Functions, Objects - Array, Date and Math Related Objects.

1. Javascript Program to Generate a Random Number
2. Write a JavaScript conditional statement to sort three numbers.
3. Write JavaScript to demonstrate loops: while, for, do-while JavaScript Program to Find the Sum of Natural Numbers
4. Create a CGPA Calculator in Web Brower using HTML, CSS and JavaScript. Use functions in JavaScript. UNIT IV DOM & Event Handling

UNIT IV DOM AND EVENT HANDLING 9 hours

Document Object Model: getElementByid(), getElementByClassName(), getElementByName(), getElementByTagName(), JS innerHTML Propery - Event Handling - Controlling Windows & Frames and Documents - Form validations- Exception Handling.

1. Write JavaScript to validate the following fields of the Registration page
2. Write a JavaScript program to demonstrate Event Handling.
3. Write a program to demonstrate exception handling in JS.

UNIT V ADVANCED FEATURES OF JAVASCRIPT 9 hours

Browser Management and Media Management – Classes – Constructors – Object-Oriented Techniques in JavaScript – Object constructor and Prototyping - Sub classes and Super classes – Introduction to JSON – JSON Structure –Introduction to jQuery –Introduction to AJAX-Bootstrap - Bootstrap components.

1. Create a Pan Card Validation form using Object Oriented JavaScript, consider the 10th character to be an alphabet.
    a) Get the user's First Name, Last Name and other required fields as input
    b) Assume the last digit of the Pan Number to be an alphabet
    c) Validate the PAN Number.
2. Construct a JSON Structure for a bookstore and validate it using JSON Validator such as http://jsonlint.com/ and parse the Json file to list the books under the category "Fiction".

3. Create a Single Page application allowing to search for a movie and displaying the trailer, poster for various movies.
    a) Create an admin login to upload the trailer, poster, keyword and details of the movie.
    b) Use Bootstrap and JQuery for designing the User Interface.
    c) Form Submission should be handled through Ajax.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Design a complete, well-organized website using HTML.

CO2: Design interactive websites and dynamically use CSS to optimize user experience

CO3: Develop the dynamic web pages using JAVA script

CO4: Create Dynamic webpages using DOMs and Form Validation.

CO5: Employ object-oriented programming principles.

Text Book(s)

1. Deitel and Deitel and Nieto, Internet and World Wide Web - How to Program, Prentice Hall, 5th Edition, 2011.

2. Java Script for Programmers Paul J. Deitel, Deitel & Associates, Inc.Harvey M. Deitel, Deitel& Associates, Inc.

Reference Books

1. Stephen Wynkoop and John Burke “Running a Perfect Website”, QUE, 2nd Edition,1999

2. Web Coding Bible, An Accelerated Course, Chong Lip Phang, 2015

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Lab Examination

Audit Course

Audit Course

24MCAP901 RESEARCH METHODOLOGY AND IPR

L	T	P	C
2	0	0	0

Pre-requisite

Course Description:

This course aims has been meticulously designed to provide a comprehensive understanding of the essential aspects of research methodology and the critical realm of Intellectual Property Rights (IPR).

Course Objectives:

This course enables students to

1. Identify and discuss the concepts and finding the criteria of good research.
2. Find sources to data collection.
3. Understand the methodologies of data analysis and reporting.
4. Understand the basics of Intellectual Property Rights.
5. Know the process of patents and filling.

UNIT I INTRODUCTION 6 hours

Introduction, Objectives and types of Research, Research approaches, Overview of research process and design, Criteria of Good Research. Research Tools.

UNIT II DATA COLLECTION AND SOURCES 6 hours

Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods, Qualitative and Quantitative Data - Preparing, Exploring, examining and displaying of data.

UNIT III DATA ANALYSIS AND REPORTING 6 hours

Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.

UNIT IV INTELLECTUAL PROPERTY RIGHTS 6 hours

Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Biodiversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.

UNIT V PATENTS 6 hours

Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification, Types of patent application, process E-filling, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents.

Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Formulate and Design research problem.
CO2: Understand and Comprehend the Data Collection Methods.
CO3: Perform Data analysis and acquire Insights.
CO4: Understand IPR and follow research ethics.
CO5: Evaluate the Patent Drafting and Filing in research areas.

Text Book(s)

1. Kothari C R, Gaurav Garg, "Research Methodology", New Age International Publishers, 5th Edition, 2023.

Reference Books

1. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013.

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

3. Catherine J. Holland, "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press, 2007

4. David Hunt, Long Nguyen, Matthew Rodgers, "Patent searching: tools & techniques", Wiley, 2007.

Mode of Evaluation: Assignments, Mid Term Tests.