ABOUT THE DEPARTMENT

The Department of MCA was established in August 1998 with the approval of AICTE and affiliation with Madurai Kamaraj University. We employ a blend of time–tested and innovative methods to transform our students into highly competent software professionals. Currently, Sourashtra College stands at the forefront, offering computer–related courses to cater to the educational needs of students, especially those from rural and underprivileged backgrounds. We are on a path towards creating history in the realm of Information Technology.

Studying MCA at Sourashtra College is a uniquely rewarding experience. Our dedicated staff members have a clear objective to provide individualized instruction, equipping learners with essential skills. We place strong emphasis on preparing students for job requirements, covering both theoretical and practical aspects of the academic programme, along with on– the– job training. The warm Student– Teacher relationship enriches the learning atmosphere on our campus.

MCA has proven to be an outstanding course for securing lucrative employment opportunities in esteemed organizations. It has become the most sought– after job–oriented programme across all colleges, attracting numerous students aspiring to hold prestigious technical positions in India and abroad. Globalization has further intensified the demand for this course, and many parents believe that their children must pursue the prestigious MCA programme.

VISION

Our vision is to excel in providing high– quality education and nurturing competitive software professionals with strong moral values. We are committed to contributing to the development of a vibrant nation, with a special focus on empowering minority communities.

MISSION

- Our mission is to pioneer a dynamic learning environment that harnesses innovative pedagogical methods across various computer science domains, emphasizing real– world applications.
- We aim to bridge the gap between academia and industry by crafting curricula aligned with industry and societal demands.
- We are committed to providing state– of– the– art physical and digital resources that foster the comprehensive development of our faculty and students.
- Our ambition is to empower our students with the skills needed to excel in their professions, adapting to the ever– evolving demands of society.
- We aspire to instill an entrepreneurial spirit and a lifelong learning mindset in our students.

ELIGIBILITY

Candidates, who have completed BCA, B. Sc. (CS), IT, Mathematics, or any degree with a minimum duration of 3 years, including Mathematics at the +2 level or at the graduate level, are eligible for admission to the MCA course.

A minimum of 50% marks in the qualifying examination is required (with additional bridge courses as per university norms), including 10 + 2 + 3 or 4– years Bachelor's pattern or 10 + 3 years Diploma + 3 years Bachelor's degree pattern.

DURATION OF THE COURSE

The MCA programme spans two academic years, comprising four semesters, with two semesters in each academic year.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Master of Computer Applications Postgraduates of the Sourashtra College will:

PEO 1	foster the development of essential skills for both a successful professional career and advanced academic pursuits by acquiring knowledge in the fields of computing, mathematics, and information communication technology.
PEO 2	enhance the capacity to strategize, analyze, design, code, test, implement, and maintain software products proficiently.
PEO 3	cultivate excellence in professionalism, ethical conduct, effective communication, teamwork, and the adoption of cutting– edge ICT tools and techniques.
PEO 4	be empowered to critically assess real– world challenges, conceptualize and construct computational models and systems, ensuring their practicality, suitability, cost– effectiveness, and societal acceptability in diverse interdisciplinary domains.
PEO 5	be equipped with the competencies necessary to pursue advanced studies and establish a research– focused career, contributing to both academia and industry through multidisciplinary research efforts.
PEO 6	get strengthened with the abilities needed to initiate entrepreneurial ventures and startup initiatives within various domains of computer science and information technology.

POSTGRADUATE (PG) PROGRAMME OUTCOMES (POs)

Postgraduate **M.C.A**. is a 2 – year degree Programme with 4 semesters consisting of the following Programme Outcomes (POs) under various criteria including critical thinking, problem solving, effective communication, societal/ citizenship/ ethical credibility, sustainable growth and employable abilities.

PO 1	Computational Proficiency: Apply foundational knowledge in computing, specialized computing areas, mathematics, and relevant domain expertise to conceptualize and model computing solutions for defined problems and requirements.
PO 2	Problem Solving Skill: Identify, define, investigate through literature review, and solve intricate computing challenges, drawing well– supported conclusions using core principles from mathematics, computer science, and related disciplinary knowledge.
PO 3	Solution Design and Development: Devise and assess solutions for complex computing problems, as well as design and evaluate systems, components, or processes that align with specific needs, taking into account considerations related to public health, safety, culture, society, and the environment.
PO 4	Investigation of Complex Computing Issues: Employ research– based knowledge and methodologies, including experimental design, data analysis, and information synthesis, to arrive at valid conclusions when investigating intricate computing problems.
PO 5	Modern Tool usage: Utilize, choose, adapt, and apply suitable techniques, resources, and contemporary computing tools proficiently in intricate computing tasks, while recognizing their limitations.
PO 6	Professional Ethics: Demonstrate an understanding of and commitment to professional ethics, cyber regulations, and the ethical norms governing the practice of computing as a responsible computing professional.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of **MCA Programme**, the students are expected/will be able to

PSO 1	demonstrate a strong grasp of fundamental concepts in related subjects, encompassing Computer Fundamentals, Computer Programming, and various Network Techniques.
PSO 2	exhibit proficiency in comprehending, assessing, and analyzing design and algorithmic principles within the domains of computer architecture, Operating Systems, Computer Networks, Software Engineering, Design and Analysis of Algorithms, Compiler Design, Artificial Intelligence, and related fields.
PSO 3	apply acquired knowledge from Data Analysis, Software Development, and other relevant areas to effectively design and address interdisciplinary problems.
PSO 4	cultivate the ability to adapt, evaluate, and implement cutting– edge industry practices while understanding and guiding the aspirations and attitudes of young minds towards higher education, research, and successful entrepreneurship.
PSO 5	evaluate their capabilities in methodical planning, development, testing, and execution of intricate computing applications, particularly in areas such as Social Media and Analytics, Web Application Development, and Data Interpretation.
PSO 6	recognize the importance of and possess the capability for self– directed learning, ensuring continuous development as a computing professional.

DISTRIBUTION OF CREDITS

PART	SEMESTER	COURSES	NUMBER OF COURSES	HOURS	CREDITS	TOTAL CREDITS
III	I– II	CORE	9	4– 5	2– 5	32
III	III– IV	CORE	8	4– 5	2– 5	31
III	I– II	ELECTIVE	4	4– 5	2– 5	12
III	III	ELECTIVE	2	4– 5	2– 5	5
III	I– II	SEC	2	2	2	4
III	III	NON–MAJOR ELECTIVE (NME)	1	5– 6	5	5
IV	III	Extension Activities	1	–	1	1
TOTAL CREDITS						90

Extra credits may be earned through SWAYAM Courses/other online courses

BRIDGE COURSE

(for students having no Mathematics/Computer Science background)

Theory Papers

S. No	Course Code	Subject Title	Credits
1		Fundamentals of Computer Science	–
2		Fundamentals of Accounting/Mathematics	–

Practical Papers

S. No	Course Code	Subject Title	Credit
1		C & C++ Programming Lab	–

MASTER OF COMPUTER APPLICATIONS

COURSE STRUCTURE

SEMESTER – I

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	24MCAC11	**Core – 1: PCC** Discrete Mathematics	4	3	25	75	100	4
2.	24MCAC12	**Core – 2: PCC** Data Structures and Algorithms	4	3	25	75	100	4
3.	24MCAC13	**Core – 3: PCC** Relational Data Base Management System	4	3	25	75	100	4
4.	24MCACP1	**Core – 4: PCC** Data Structures and Algorithms using Python Lab	4	3	40	60	100	2
5.	24MCACP2	**Core – 5: PCC** Relational Data Base Management System Lab	4	3	40	60	100	2
6.	24MCASP1	**SEC – 1:** Soft Skill Development Lab	2	3	40	60	100	2
7.		**Elective – I: PEC**	4	3	25	75	100	4
	24MCAE11	Internet of Things						
	24MCAE12	Digital Marketing						
	24MCAE13	Cyber Security						
8.		**Elective – II: PEC**	4	3	40	60	100	2
	24MCAEP1	Internet of Things Lab						
	24MCAEP2	Digital Marketing Lab						
	24MCAEP3	Cyber Forensics Lab						
		Total	**30**				**800**	**24**

***One elective course to be chosen from THREE courses**

SEC: Skill Enhancement Course

SEMESTER – II

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	24MCAC21	**Core – 6: PCC** Advanced Java Programming	5	3	25	75	100	5
2.	24MCAC22	**Core – 7: PCC** Linux and Shell Programming	5	3	25	75	100	5
3.	24MCACP3	**Core – 8: PCC** Advanced Java Programming Lab	5	3	40	60	100	3
4.	24MCACP4	**Core – 9: PCC** Linux and Shell Programming Lab	5	3	40	60	100	3
5.		**Elective – III: PEC**	4	3	25	75	100	4
	24MCAE21	Big Data Analytics						
	24MCAE22	Social Media Marketing						
	24MCAE23	Cryptography						
6.		**Elective – IV: PEC**	4	3	40	60	100	2
	24MCAEP4	Big Data Analytics Lab						
	24MCAEP5	Social Media Marketing Lab						
	24MCAEP6	Cryptography Lab						
7.	24MCACV1	**Core – 10: PCC:** Internship / Mini– Project	-	-	-	-	-	-
8.		• **SWAYAM/ NPTEL**	–	–	–	100	100	1
		Total	**30**				**700**	**24**

***One elective course to be chosen from THREE courses**

- **Extra– Credit Course**

SEMESTER – III

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.		**Core – 11: PCC** Artificial Intelligence and Machine Learning	4	3	25	75	100	3
2.		**Core – 12: PCC** Data Communication and Computer Networks	4	3	25	75	100	3
3.		**Core – 13: PCC** Software Project Management	4	3	25	75	100	3
4.		**Core – 14: PCC** Network Programming Lab	4	3	40	60	100	2
5.		**Elective – V: PEC**	4	3	25	75	100	3
		Web Technology						
		Search Engine Optimization						
		Cyber Crime and Cyber Law						
6.		**Elective – VI: PEC**	3	3	40	60	100	2
		Web Technology Lab						
		Search Engine Optimization Lab						
		Digital Device Security Lab						
7.		**NME:** Social, Legal, and Ethical Issues in Computing	5	3	25	75	100	5
8.		**SEC – 2:** Research Methodology and IPR	2	3	25	75	100	2
9.		**Internship**	-	-	40	60	100	1
10.		**Extension Activities**	–	-	-	100	100	1
		Total	30				800	25

SEMESTER – IV

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.		**Core – 15: PCC** Full Stack Development	3	3	25	75	100	3
2.		**Core – 16: PCC** Full Stack Development Lab	5	3	40	60	100	3
3.		Data Visualization Lab	2	3	40	60	100	2
4.		**Core – 17: PCC** Project	20	3	40	60	100	10
5.		• Women Empowerment	–	-	-	100	100	1
		Total	30				400	18

- **Extra– Credit Course (Self – Study Course)**

COURSE STRUCTURE – I SEMESTER

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	24MCAC11	**Core – 1: PCC** Discrete Mathematics	4	3	25	75	100	4
2.	24MCAC12	**Core – 2: PCC** Data Structures and Algorithms	4	3	25	75	100	4
3.	24MCAC13	**Core – 3: PCC** Relational Data Base Management System	4	3	25	75	100	4
4.	24MCACP1	**Core – 4: PCC** Data Structures and Algorithms using Python Lab	4	3	40	60	100	2
5.	24MCACP2	**Core – 5: PCC** Relational Data Base Management System Lab	4	3	40	60	100	2
6.	24MCASP1	**SEC – 1:** Soft Skill Development Lab	2	3	40	60	100	2
7.		**Elective – I: PEC**	4	3	25	75	100	4
	24MCAE11	Internet of Things						
	24MCAE12	Digital Marketing						
	24MCAE13	Cyber Security						
8.		**Elective – II: PEC**	4	3	40	60	100	2
	24MCAEP1	Internet of Things Lab						
	24MCAEP2	Digital Marketing Lab						
	24MCAEP3	Cyber Forensics Lab						
		Total	**30**				**800**	**24**

***One elective course to be chosen from THREE courses**

CA – Class Assessment (Internal)
SE – Summative Examination
SEC – Skill Enhancement Course
PCC – Professional Competency Course (Core)
PEC – Professional Elective Course
T – Theory
P – Practical

Passed in the BoS Meeting held on 09/03/2024 **Signature of the Chairman**

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAC11	DISCRETE MATHEMATICS	CORE – 1 PCC	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION

Discrete mathematics delves into the exploration of mathematical structures characterized by their discrete, isolated, or distinct nature, diverging from the realm of calculus, which primarily addresses continuous change. The Discrete Mathematics course serves as an introductory gateway, acquainting students with fundamental discrete mathematical concepts. Topics covered include sets, logic, probability, recurrence relations, induction, and graph theory.

COURSE OBJECTIVES

- To know the concepts of relations and functions.
- To distinguish among different normal forms and quantifiers.
- To solve recurrence relations and permutations & combinations.
- To know and solve matrices, rank of matrix & characteristic equations.
- To study the graphs and its types.

COURSE OUTCOMES (COs):

On the successful completion of the course, students will be able

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the concepts of relations and functions distinguish among normal forms	Upto K5
CO 2	analyze and evaluate the recurrence relations	Upto K5
CO 3	distinguish among various normal forms and predicate calculus	Upto K5
CO 4	solve and know various types of matrices	Upto K5
CO 5	evaluate and solve various types of graphs	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

DISCRETE MATHEMATICS

UNIT– I:

Relations – Binary relations – Operations on relations– properties of binary relations in a set – Equivalence relations – Representation of a relation by a matrix – Representation of a relation by a digraph – **Functions** – Definition and examples – Classification of functions– Composition of functions– Inverse function

UNIT– II:

Mathematical Logic – Logical connectives – **Well – formed formulas** – Truth table of well– formed formula – Algebra of proposition – Quine's method – **Normal forms of well– formed formulas** – Disjunctive normal form – Principal Disjunctive normal form – Conjunctive normal form – Principal conjunctive normal form – **Rules of Inference for propositional calculus** – **Quantifiers** – Universal Quantifiers – Existential Quantifiers

UNIT– III:

Recurrence Relations – Formulation – solving recurrence Relation by Iteration– solving Recurrence Relations – Solving Linear Homogeneous Recurrence Relations of Order Two – Solving Linear Non homogeneous Recurrence Relations. **Permutations**– Cyclic permutation – Permutations with repetitions – permutations of sets with indistinguishable objects – **Combinations** – Combinations with repetition

UNIT– IV:

Matrices – special types of matrices – Determinants – Inverse of a square matrix– Cramer's rule for solving linear equations– Elementary operations– Rank of a matrix– solving a system of linear equations– characteristic roots and characteristic vectors– Cayley– Hamilton Theorem– problems

UNIT– V:

Graphs – Connected Graphs – Euler Graphs– Euler line– Hamiltonian circuits and paths –planar graphs – Complete graph– Bipartite graph– Hyper cube graph– Matrix representation of graphs

TEXT BOOKS:

N. Chandrasekaran and M. Umaparvathi, ***Discrete Mathematics***, PHI Learning Private Limited, New Delhi, 2010.

REFERENCE BOOKS:

1. Kimmo Eriksson & Hillevi Gavel, ***Discrete Mathematics and Discrete Models***, Student literature AB, 2015.
2. Kenneth H. Rosen, ***Discrete Mathematics and Applications***, Mc Graw Hill, 2012

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

1. https://faculty.ksu.edu.sa/sites/default/files/rosen_discrete_mathematics_and_its_applications_7th_edition.pdf
2. https://www.coursera.org/specializations/mathematics– machine– learning
3. www.coursera.org/learn/datasciencemathskills
4. http://home.iitk.ac.in/~psraj/mth101/lecture_notes/lecture31.pdf

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2		1	2
CO2	2		1	1		2
CO3			1			1
CO4			1	1	1	1
CO5	2		2			1

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE DESIGNER: Prof. S. K. GANESHBABU

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAC12	DATA STRUCTURES AND ALGORITHMS	CORE – 2 PCC	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓		

COURSE DESCRIPTION:

This Course describes different data structures and how to use them effectively for solving problems. It is expected that the students have basic experience in any high – level programming language.

COURSE OBJECTIVES:

- To get a clear understanding of various ADT structures.
- To understand how to implement different ADT structures with real– time scenarios.
- To analyze the various data structures with their different implementations.
- To get an idea of applying right models based on the problem domain.
- To realize, and understand how and where to implement modern data structures with Python language.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand various ADT concepts	Upto K5
CO 2	become familiar with implementation of ADT models with Python language and understand how to develop ADT for the various real– time problems	Upto K5
CO 3	apply with proper ADT models with problem understanding	Upto K5
CO 4	apply and Analyze right models based on the problem domain	Upto K5
CO 5	evaluate modern data structures with Python language	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

DATA STRUCTURES AND ALGORITHMS

UNIT– I:

Abstract Data Types: Introduction – The Date Abstract Data Type – Bags – Iterators. **Arrays**: Array Structure – Python List – Two Dimensional Arrays – Matrix Abstract Data Type. **Sets, Maps:** Sets – Maps – Multi – Dimensional Arrays.

UNIT– II:

Algorithm Analysis: Experimental Studies – Seven Functions – Asymptotic Analysis. **Recursion:** Illustrative Examples – Analyzing Recursive Algorithms – Linear Recursion – Binary Recursion – Multiple Recursion.

UNIT– III:

Stacks, Queues, and Deques: Stacks – Queues – Double – Ended Queues.
Linked Lists: Singly Linked Lists – Circularly Linked Lists – Doubly Linked Lists.
Trees: General Trees – Binary Trees – Implementing Trees – Tree Traversal Algorithms.

UNIT– IV:

Priority Queues: Priority Queue Abstract Data Type – Implementing a Priority Queue– Heaps – Sorting with a Priority Queue. **Maps, Hash Tables, and Skip Lists:** Maps and Dictionaries – Hash Tables – Sorted Maps – Skip Lists– Sets, Multisets, and Multimaps.

UNIT– V:

Search Trees: Binary Search Trees – Balanced Search Trees – AVL Trees – Splay Trees. **Sorting and Selection:** Merge sort – Quick sort – Sorting through an Algorithmic Lens – Comparing Sorting Algorithms – Selection. **Graph Algorithms:** Graphs – Data Structures for Graphs – Graph Traversals – Shortest Paths – Minimum Spanning Trees.

TEXT BOOKS:

1. Rance D. Necaise, ***Data Structures and Algorithms Using Python***, John Wiley & Sons, 2011. (Unit – 1) **Chapters:** 1, 2, 3.
2. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, ***Data Structures and Algorithms in Python***, John Wiley & Sons, 2013. (Unit – 2, 3, 4, and 5) **Chapters:** 3 to 12, and 14.

REFERENCE BOOKS:

1. Dr. Basant Agarwal; Benjamin Baka, ***Hands – On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7***, Packt Publishing, 2018.
2. Magnus Lie Hetland, ***Python Algorithms: Mastering Basic Algorithms in the Python Language***, Apress, 2014.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://www.researchgate.net/publication/372345381_Data_Structures_and_Algorithms_Python
- https://nibmehub.com/opac-service/pdf/read/Data%20Structures%20and%20Algorithms%20Using%20Python.pdf
- https://nibmehub.com/opac-service/pdf/read/Data%20Structures%20and%20Algorithms%20in%20Python.pdf

Mapping of CO with PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	1	1	1
CO2	3	2	3	2	2	1
CO3	3	3	3	1	1	1
CO4	3	3	3	1	1	1
CO5	3	3	3	1	2	2

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAC13	RELATIONAL DATABASE MANAGEMENT SYSTEM	CORE – 3 PCC	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓		

COURSE DESCRIPTION:

The main objective of this course is to acquire knowledge in the principles and methodologies of database management and database design. Throughout the semester, we will delve into topics such as relational database design, normalization, SQL queries, interfaces for accessing database data, and documentation. The lectures will also address ethical considerations and privacy issues associated with real time database applications.

COURSE OBJECTIVES:

- To provide a strong foundation in database concepts, technology, and practice.
- To familiarize E– R models and relational models.
- To practice SQL programming through a variety of database problems.
- To demonstrate the use of concurrency and transactions in database.
- To design and build database applications for real world problems.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS	Upto K5
CO 2	learn the physical and logical database designs, database modelling, relational, hierarchical, and network models.	Upto K5
CO 3	use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation.	Upto K5
CO 4	design and build simple database systems and relate the concept of transaction, concurrency control and recovery in database	Upto K5
CO 5	evaluate the analysed concept, including modelling and design.	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

RELATIONAL DATABASE MANAGEMENT SYSTEM

UNIT – I:

Basic Concepts: Database – System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators, History of Database Systems. Introduction to the Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.

UNIT – II:

Entity – Relationship Model: Entity Types, Entity Sets, Attributes & keys, Relationships, Relationships Types, Roles and Structural Constraints, Design issues, E – R Diagrams, Design of an E– R Database Schema, Reduction of an E– R Schema to Tables.

Relational Data Model: Relational model concepts, Integrity constraints over Relations, Relational Algebra –Basic Operations.

UNIT – III:

SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database. Intermediate SQL: Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization.

NoSQL Databases: Introduction – Types of NoSQL – Need of NoSQL Databases – Use Cases.

UNIT – IV:

Relational Database Design: Functional Dependencies, Decomposition, Normal forms based on primary keys (1 NF, 2 NF, 3 NF, & BCNF)

Transaction Processing Concepts: Introduction to Transaction Processing, Transaction & System Concepts, Properties of Transaction, Schedules and Recoverability, Serializability of Schedules.

Concurrency Control Techniques: Locking Techniques, Timestamp ordering, Multi–version Techniques, Optimistic Techniques, Granularity of Data items.

UNIT – V:

Databases for Advanced Applications: Active database concepts, Temporal database concepts, Spatial databases, Deductive databases; Emerging Database Technologies: Mobile databases, Multimedia Databases, Geographic information systems (GIS); XML and Internet Databases: Structured, Semi– structured and Unstructured Data, Introduction to web databases and XML, Structure of XML data.

CASE STUDY: (Internal Valuation)

Recent trends in Database Management: Automation in Database Management - Data Democratization - Data Mesh and Data Fabrication - Data Observability - Data Analytics with Governance Capabilities - Data Transformation Using Advanced Data Stack - Evolution of Containerized Apps and Cloud-native Technologies.

TEXT BOOKS:

Silberschatz, A., Korth, H.F. and Sudarshan, S., ***Database System Concepts***, McGraw– Hill, 2013.

REFERENCE BOOKS:

1. S K Singh, ***Database Systems: Concepts, Design and Applications***, Pearson Education, 2nd edition, 2011.
2. C J Date, A Kannan, S Swaminathan, ***An Introduction to Database Systems***, Pearson Education, 8th Edition, 2006.
3. Steve Suehring, Tim Converse, Joyce Park, ***PHP 6 and MySQL,*** Bible, Wiley, 2009.

DIGITAL TOOLS::

Web links and Video Lectures (e– Resources):

- https://docs.oracle.com/en/database/index.html
  https://docs.oracle.com/database/121/SQLRF/toc.html

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	3
CO2	3	3	3	2	3	3
CO3	3	2	3	3	2	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE DESIGNER: Dr. K. ANURATHA

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCACP1	DATA STRUCTURES AND ALGORITHMS USING PYTHON LAB	CORE – 4 PCC	-	4	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	✓

COURSE DESCRIPTION:

This course investigates abstract data types (ADTs), recursion, algorithms for searching and sorting, and basic algorithm analysis. ADTs to be covered include lists, stacks, queues, priority queues, trees, and graphs.

COURSE OBJECTIVES:

- To understand Stack, Queue and Doubly Linked ADT structures.
- To implement different ADT structures with real– time scenarios.
- To analyze the recursion concepts.
- To apply different sorting and tree techniques.
- To implement modern data structures with Python language.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	have a strong understanding in various ADT concepts	Upto K5
CO 2	become a familiar with implementation of ADT models	Upto K5
CO 3	apply sort and tree search algorithms	Upto K5
CO 4	evaluate the different data structure models	Upto K5
CO 5	learn how to develop ADT for the various real– time problems	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

DATA STRUCTURES AND ALGORITHMS USING PYTHON LAB

Python basics

1. Python Program for implementing the following concept: Basic Data types, List, Tuple, Set, Dictionary and Range.
2. Python Program to implement 'Control Statements'.
3. Python Program to implement Arrays, Strings and functions.
4. Python Program using 'Classes and Objects', 'Inheritance and Polymorphism' and 'Exceptions'.

Implement the following problems using Python 3.4 and above

1. Recursion concepts.
   Linear recursion
   Binary recursion.
2. Stack ADT.
3. Queue ADT.
4. Doubly Linked List ADT.
5. Heaps using Priority Queues.
6. Merge sort.
7. Quick sort.
8. Binary Search Tree.
9. Minimum Spanning Tree.
10. Depth First Search Tree traversal.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://mrcet.com/pdf/Lab%20Manuals/CSE/DATA%20STRUCTURES%20THROUGH%20PYTHON%20LAB%20MANUAL(R20A0503).pdf
- https://vjit.ac.in/wp– content/uploads/2022/02/Data– Structures– Python– Programming– Lab– Manual.pdf
- https://www.scribd.com/document/490561887/Python– lab– manual– pdf

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	1	1	1
CO2	3	2	3	2	2	1
CO3	3	3	3	1	1	1
CO4	3	3	3	2	2	3
CO5	3	3	3	3	1	2

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCACP2	RELATIONAL DATABASE MANAGEMENT SYSTEM LAB	CORE – 5 PCC	-	4	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

The objective of this lab course is to understand the practical applicability of database management system concepts. It enables the students to create SQL queries for the small projects and to create database objects that include tables, constraints, indexes, and sequences.

COURSE OBJECTIVES:

- To practice the concepts learnt in the subject RDBMS by developing a database.
- To practice the designing, developing and querying a database.
- To devise queries using DDL, DML, DCL and TCL commands.
- To develop application programs using PL/SQL.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	design entity– relationship diagrams to solve given database applications.	Upto K5
CO 2	implement a database schema for a given problem.	Upto K5
CO 3	formulate SQL queries in Oracle for the given problem.	Upto K5
CO 4	apply normalization techniques to improve the database design for the given problem.	Upto K5
CO 5	build database and verify for its appropriate normalization for any given problem.	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

RELATIONAL DATABASE MANAGEMENT SYSTEM LAB

List of Programs:

1. Implement DDL Commands
2. Implement Constraints
3. Implement DML Commands
4. Implement DCL Commands
5. Implement Aggregate Functions
6. Implement Built-in-Functions
7. Implement Nested Queries and Joins
8. Implement Nested Queries and Joins
9. Implement Views
10. Implement Trigger
11. Implement Cursors
12. Implement Functions and Procedures
13. Practice to design ER diagram and convert into relational model.
14. Create database and computations done on data

Exercises:

1. Create the following tables with properly specifying Primary keys, Foreign keys and solve the following queries. BRANCH (Branchid, Branch name, HOD)
STUDENT (USN, Name, Address, Branchid, sem)
BOOK (Bookid, Book name, Authorid, Publisher, Branchid) AUTHOR (Authorid, Authorname, Country, age) BORROW (USN, Bookid, Borrowed_Date)
Execute the following Queries:
i. List the details of Students who are all studying in 2nd sem MCA.
ii. List the students who are not borrowed any books.
iii. Display the USN, Student name, Branch_name, Book_name, Author_name, Books_Borrowed_Date of 2nd sem MCA Students who borrowed books.
iv. Display the number of books written by each Author.
v. Display the student details who borrowed more than two books.
vi. Display the student details who borrowed books of more than one Author.
vii. Display the Book names in descending order of their names.
viii. List the details of students who borrowed the books which are all published by the same publisher.

2. Consider the following schema: STUDENT (USN, name, date_of_birth, branch, mark1, mark2, mark3, total, GPA) Execute the following queries: i. Update the column total by adding the columns mark1, mark2, mark3. ii. Find the GPA score of all the students. iii. Find the students who born on a particular year of birth from the date_of_birth column. iv. List the students who are studying in a particular branch of study. v. Find the maximum GPA score of the student branch wise. vi. Find the students whose name starts with the alphabet "S". vii. Find the students whose name ends with the alphabets "AR". viii. Delete the student details whose USN is given as 1001

3. Design an ER diagram for the following scenario, Convert the same into a relational model and then solve the following queries. Consider a Cricket Tournament "ABC CUP" organized by an organization. In the tournament there are many teams are contesting each having a Teamid, Team_Name, City, a coach. Each team is uniquely identified by using Teamid. A team can have many Players and a captain. Each player is uniquely identified by Playerid, having a Name, and multiple phone numbers,age. A player represents only one team. There are many Stadiums to conduct matches. Each stadium is identified using Stadiumid, having a stadium_name,Address (involves city, area_name, pincode). A team can play many matches. Each match played between the two teams in the scheduled date and time in the predefined Stadium. Each match is identified uniquely by using Matchid. Each match won by any of the one team that also wants to record in the database. For each match man_of_the match award given to a player.
Execute the following Queries:
i. Display the youngest player (in terms of age) Name, Team name, age in which he belongs of the tournament.
ii. List the details of the stadium where the maximum number of matches were played.
iii. List the details of the player who is not a captain but got the man_of _match award at least in two matches.
iv. Display the Team details who won the maximum matches.
v. Display the team name where all its won matches played in the same stadium.

4. A country wants to conduct an election for the parliament. A country having many constituencies. Each constituency is identified uniquely by Constituency_id, having the Name, belongs to a state,Number_of_voters. A constituency can have many voters. Each voter is uniquely identified by using Voter_id, having the Name, age, address (involves Houseno,city,state,pincode). Each voter belongs to only one constituency. There are many candidates contesting in the election. Each candidates are uniquely identified by using candidate_id, having Name, phone_no, age, state. A candidate belongs to only one party.Thereare many parties. Each party is uniquely identified by using Party_id, having Party_Name,Party_symbol. A candidate can contest from many constituencies under a same party. A party can have many candidates contesting from different constituencies. No constituency having the candidates from the same party. A constituency can have many contesting candidates belongs to different parties. Each voter votes only one candidate of his/her constituencty.
Queries:
i. List the details of the candidates who are contesting from more than one constituencies which are belongs to different states.
ii. Display the state name having maximum number of constituencies.
iii. Create a stored procedure to insert the tuple into the voter table by checking the voter age. If voter's age is at least 18 years old, then insert the tuple into the voter else display the "Not an eligible voter msg".
iv. Create a stored procedure to display the number_of_voters in the specified constituency. Where the constituency name is passed as an argument to the stored procedure.

v. Create a TRIGGER to UPDATE the count of " Number_of_voters" of the respective constituency in "CONSTITUENCY" table , AFTER inserting a tuple into the "VOTERS" table.

5. Design an ER diagram for the following scenario, Convert the same into a relational model, normalize Relations into a suitable Normal form and then solve the following queries. A country can have many Tourist places. Each Tourist place is identified by using tourist_place_id, having a name, belongs to a state, Number of kilometers away from the 02.03.2021 updated 52/ 104 capital city of that state,history. There are many Tourists visits tourist places every year. Each tourist is identified uniquely by using Tourist_id, having a Name, age, Country and multiple emailids. A tourist visits many Tourist places, it is also required to record the visted_date in the database. A tourist can visit a Tourist place many times at different dates. A Tourist place can be visited by many tourists either in the same date or at different dates.
Queries:
i. List the state name which is having maximum number of tourist places.
ii. List details of Tourist place where maximum number of tourists visited.
iii. List the details of tourists visited all tourist places of the state "KARNATAKA".
iv. Display the details of the tourists visited at least one tourist place of the state, but visited all states tourist places.
v. Display the details of the tourist place visited by the tourists of all country.

6. Consider the following database of student enrollment in courses and books adopted for each course. STUDENT (regno#: string, name: string, major: string, bdate: date)
COURSE (course#: int, cname: string, dept: String)
TEXT (book_ISBN#: int, book_title: string, publisher: string, author: string) ENROLL (regno#: string, course#: int, sem: int, marks: int) BOOK_ADOPTION (course#: int, sem: int, book_ISBN: int)
 Create the above tables by properly specifying the primary keys and the foreign keys
 Enter at least 7 to 10 records to each table. Execute SQL queries for the following requirements:
i. List out the student details, and their course details. The records should be ordered in a semester wise manner.
ii. List out the student details under a particular department whose name is ordered in a semester wise
iii. List out all the book details under a particular course
iv. Find out the Courses in which number of students studying will be more than 2.
v. Find out the Publisher who has published more than 2 books.
vi. Find out the authors who have written book for I semester, computer science course.
vii. List out the student details whose total number of months starting from their date of birth is more than 225
viii. Find out the course name to which maximum number of students have joined.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://www.bharathuniv.ac.in/downloads/csc/BCS4L1–Database%20Management%20lab.pdf
- https://www.msuniv.ac.in/images/e–content/16.ORDBMS%20Concepts%20and%20Oracle– Lab%20Exercises%20%20and%20Solutions.pdf
- https://mrcet.com/pdf/Lab%20Manuals/DATABASE%20MANAGEMENT%20SYSTEMS%20LABORATORY%20MANUAL%20&%20RECORD.pdf

Mapping of CO with PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	1	3

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE DESIGNER: Dr. K. ANURATHA

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCASP1	SOFT SKILL DEVELOPMENT LAB	SEC – 1	-	2	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

The focus of the course is to develop a wide variety of soft skills starting from communication, to working in different environments, developing emotional sensitivity, learning creative and critical decision making, developing awareness of how to work with and negotiate with people and to resolve stress and conflict in ourselves and others.

COURSE OBJECTIVES:

- To enable students to gain basic communication skills in professional and social contexts effectively.
- To enable students acquire useful words and apply them in situational context.
- To develop listening and reading skills through comprehension passages.
- To enrich the leadership qualities and interpersonal communication.
- To enhance essential characteristics in writing.

COURSE OUTCOMES (COs):

On the successful completion of the course, students will be able to:

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	learn to create compelling resumes and prepare effectively for job interviews.	Upto K5
CO 2	learn to manage oneself during communication, acquire strong communication skills, and build self–confidence.	Upto K5
CO 3	develop (verbal/oral) effective presentation skills.	Upto K5
CO 4	develop skills to participate effectively in group discussions.	Upto K5
CO 5	understand the concept of personality and successfully navigate interviews.	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

SOFT SKILL DEVELOPMENT LAB

EXERCISES

1. Characteristics of Technical Writing
2. Development of Employability Skills
3. Vocabulary Development
4. Sentence Completion
5. Error Spotting
6. Interpretation of Verbal Analogy
7. Interpretation of Reading (Comprehension – Conception)
8. Interpretation of Reading (Comprehension – Reasoning)
9. Practice for writing E– mails/Technical Blogs/Forums
10. PPT Preparation / Demonstration of Technical Presentation
11. Preparation of Resume
12. Preparation for Job Interviews / Mock Interview Section
13. Group Discussion Skills
14. Developing Listening Skill (Comprehension)
15. Practice for Short Speeches / Situational Conversation
16. English through Mass Media
17. Essential Grammar
18. Communicating and collaborating with peer members
19. Team Empowerment
20. Persuasive Communication

TEXT BOOKS:

1. Uma Narula, ***Development Communication: Theory and Practice***, Revised Edition, Har– Aanad Publication, 2019.
2. Annette Capel and Wendy Sharp, ***Cambridge English: Objective*** First, Fourth Edition, Cambridge University Press, 2013.
3. Emma Sue– Prince, ***The Advantage: The 7 Soft Skills You Need to Stay One Step Ahead***, First Edition, FT Press, 2013.

REFERENCE BOOKS:

1. Michael McCarthy and Felicity O'Dell, ***English Vocabulary in Use: 100 Units of Vocabulary Reference and Practice***, Cambridge University Press, 1996.
2. Murphy, Raymond, ***Intermediate English Grammar***, Second Edition, Cambridge University Press, 1999.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

https://amolshakadwipi.files.wordpress.com/2018/09/soft– skills– lab– manual_snjb.pdf
http://osou.ac.in/eresources/GE6674–Communication%20and%20Soft%20Skills %20Laboratory– 1526017507.pdf
https://mu.ac.in/wp– content/uploads/2022/05/MCA– Soft– Skills– Development– Lab– 3.pdf

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	1	2	3
CO2	3	2	3	3	3	2
CO3	3	3	3	3	3	3
CO4	3	2	2	3	2	1
CO5	2	3	2	1	3	2

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAE11	INTERNET OF THINGS	PC	4	-	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	✓

COURSE DESCRIPTION:

This course aims to provide a basic understanding of Internet of Things. It offers hands on training for building simple applications using appropriate sensors, microcontroller board and other components.

COURSE OBJECTIVES:

- To understand the underlying concepts of Internet of Things (IoT)
- To know the challenges and future directions of IoT.
- To distinguish various applications in IoT.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	define Internet of Things & its characteristics and IoT enabling technologies.	Upto K5
CO 2	describe the differences and similarities between IoT & M2M and managing IoT systems.	Upto K5
CO 3	understand IoT Platform design methodology and developing IoT System using Python.	Upto K5
CO 4	identify the various IoT physical components, server and cloud.	Upto K5
CO 5	demonstrate Data Analytics for IoT.	Upto K5

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

INTERNET OF THINGS

UNIT – I:

Introduction to Internet of Things: Introduction – physical design of IoT – Logical design of IoT – IoT enabling technologies – IoT levels & deployment templates.

Domain Specific IoTs: Introduction – Home automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health & Lifestyle.

UNIT – II:

IoT and M2M: Introduction – M2M – difference between IoT and M2M – SDN and NFV for IoT.

IoT System Management with NETCONF-YANG: Need for IoT management – SNMP – network operator requirements – IoT system management with NETCONF-YANG.

UNIT – III:

IoT Platforms Design Methodology: Introduction – IoT design methodology – case study on IoT system for weather monitoring.

IoT Systems – Logical Design using Python: - Introduction – installing python – data types – data structure – control flow – functions – modules – packages – file handling – data & time operations – classes – packages for IoT.

UNIT – IV:

IoT Physical Devices & Endpoints: IoT device definition – Raspberry Pi – about the board – Linux on raspberry Pi – raspberry Pi interfaces – programming raspberry Pi with python – other IoT devices.

IoT Physical Servers & Cloud Offerings Introduction – WAMP – Xively – Django – designing a REST ful Web API – Amazon web services for IoT.

UNIT – V:

Data Analytics for IoT: Introduction – Apache Hadoop – Using Hadoop MapReduce for batch data analysis – Apache Oozie – Apache Spark – Apache Storm – using Apache Storm for real time data analysis.

Case studies illustrating IoT Design: Introduction – Home Automation.

TEXT BOOK:

Arshdeep Bahga, Vijay Madisetti, "***Internet of Things – A hands on Approach***", University Press, Hyderabad, 2018.

REFERENCE BOOKS:

1. Donald Norris ***—The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black***, Mc.Graw Hill,2015.
2. CunoPfister ***—Getting Started with the Internet of Things***, O'Reilly Media, Inc.,2011
3. Honbo Zhou ***—The Internet of Things in the Cloud: A Middleware Perspective***, Press,2012
4. Olivier Hersent, David Boswarthick, Omar Elloumi, ***—The Internet of Things, Key applications and Protocols***, Wiley, 2012

DIGITAL TOOLS:

- https://www.javatpoint.com/iot-internet-of-things
- https://www.guru99.com/iot-tutorial.html
- https://azure.microsoft.com/en-us/overview/internet-of-things-iot/what-is-the-internet-of-things/#overview
- http://www.microsoft.com/en-in/server-cloud/internet-of-things.aspx

Mapping of CO with PO

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2	3	2	3
CO2	3	3	2	3	2	3
CO3	2	3	2	3	2	3
CO4	3	3	2	3	2	3
CO5	3	3	3	3	2	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Dr. K. ANURATHA

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAE12	DIGITAL MARKETING	ELECTIVE - 1 II PEC	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓		

COURSE DESCRIPTION:

This course aims to familiarize students with the concept of digital marketing and its current and future evolutions. It further aims to be able to equip students with the ability to understand and subsequently create strategic and targeted campaigns using digital media tools.

COURSE OBJECTIVES:

- To make the students understand the concept of digital marketing and its real– world iterations.
- To articulate innovative insights of digital marketing enabling a competitive edge.
- To make the students understand how to create and run digital media– based campaigns.
- To identify and utilise various tools such as social media etc.
- To create a successful digital marketing strategy.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	explain the concept of digital marketing and Business Models.	Upto K5
CO 2	observe Market sensing and role of social media in digital brand communications	Upto K5
CO 3	discuss the various digital advertising tools like e– mail and online games.	Upto K5
CO 4	develop effective website and apps.	Upto K5
CO 5	recognize social media metrics in Digital Analytics. Planning & Organization of Digital Marketing.	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

DIGITAL MARKETING

UNIT – I:

Introduction to Digital Marketing: Definition of Digital Marketing – Digital Marketing versus traditional marketing – Digital Marketing and the Marketing Mix – Digital Marketing in relation to business processes – Development of Digital Marketing – Two important models for Digital Marketing communication.

Strategy and Business Models: Digital Marketing and Strategy – Marketing Strategy – The business model – Determining the impact of new internet technology on Digital Marketing.

UNIT – II:

Market Sensing: Internet usage – Online shopping behaviour – Online buying process and the Digital Marketing funnel – Use of social media – Online Market Research – Big data and customer insights – Relevant trends in Digital Marketing.

Digital Brand Communications: Digital Marketing communication: the basis – Role of Digital Marketing communications in brand management – Role of social media in digital brand communications – Content marketing – Mobile communications.

UNIT – III:

Customer acquisition through owned channel: Using digital communications and sales channels to reach and win customers – Search Engine Marketing – Link– building – Use of social media channels – Email marketing – Marketing automation.

Customer acquisition through paid channel: Digital Marketing communication through paid channels – Paid Search (Pay– Per– Click = PPC) – Online display advertising – Advertising on social networks – Affiliate marketing – Using online games for advertising.

UNIT – V:

Customer Relationship Management (CRM): Digital customer relationship management – Working with customer groups – Encouraging customer satisfaction and loyalty – Increasing customer value – Individual value propositions – Social CRM.

Designing Effective Websites and Apps: Effectiveness of websites and apps – Influencing the visitor – Website usability – Web content and web text – Interaction and conversion – Effective landing pages – Search Engine Optimisation (SEO) – The development of an effective app.

UNIT – V:

Digital analytics: Definition and starting points – The Digital Marketing funnel translated into performance indicators – Different traffic sources within digital analytics – The ABC Model: The Digital Marketing funnel – Recognising the phase that the visitor is in – Social media metrics – Digital analytics in the organisation.

Organisation565

Planning and Organisation: Organising Digital Marketing activities – Digital Marketing plan – Project management – Security measures against cybercrime – Legal aspects of Digital Marketing.

TEXT BOOKS:

Marjolein Visser RM, Berend Sikkenga SMP & Mike Berry, ***Digital Marketing Fundamentals***, 2nd edition, 2021, Noordhoff Groningen / Utrecht, The Netherlands.

REFERENCE BOOKS:

1. Chaffey, D., & Smith, P. R. (2017). ***Digital Marketing Excellence: Planning, Optimizing And Integrating Online Marketing***. Taylor & Francis.
2. Dodson, I. (2016). ***The Art of Digital Marketing: The Definitive Guide To Creating Strategic, Targeted, And Measurable Online Campaigns***. John Wiley & Sons.
3. Damian Ryan, ***Understanding Digital Marketing, Marketing Strategies For Engaging The Digital Generation***, 3rd Edition, 2014, Kogan Page, London Philadelphia, New Delhi.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://www.simplilearn.com/tutorials/digital– marketing– tutorial
- https://intellipaat.com/blog/digital– marketing– tutorial/
- https://www.guru99.com/free– digital– marketing– tutorial.html
- https://www.javatpoint.com/digital– marketing

Mapping of CO with PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	3	3	2	3
CO2	2	3	3	3	2	3
CO3	2	3	3	3	2	3
CO4	3	3	3	3	2	3
CO5	2	3	3	3	2	3

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAE13	CYBER SECURITY	ELECTIVE - 1 – III PEC	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓		

COURSE DESCRIPTION:

From this course, student will gain a comprehensive understanding of best practices for safeguarding data during transmission and ensuring the security of network infrastructures. They will explore legal and regulatory considerations, including privacy laws, copyright issues, and data protection regulations. Additionally, they will learn how to proactively prevent, monitor, and effectively respond to data breaches and cyberattacks.

COURSE OBJECTIVES:

- To make the students understand the difference between threat, risk, attack and vulnerability and able to realize how threats materialize into attacks.
- To make the students analyze typical threats, attacks and exploits and the motivations behind them.
- To focus on the models, tools, and techniques for enforcement of security with some emphasis on the use of cryptography.
- To make the students study about cyber laws in different countries.
- To analyze the cyber security needs of an organization.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand, describe, analyze and examine the basics of Cyber security concepts and its implementation in India	Upto K5
CO 2	comprehend and demonstrate the security tips in browsers, WLAN, social networks, Email security and Smart phone. Apply the investigations in post mortem and Forensics	Upto K5
CO 3	understand, apply and evaluate the various investigation roles and Wi Fi protecting mechanisms.	Upto K5
CO 4	understand, illustrate and evaluate the method of seize the digital information and evidences forensics data and evaluate the forensics reports	Upto K5
CO 5	comprehend, apply and appraise the methods digital forensics with cybercrime prevention techniques	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

CYBER SECURITY

UNIT – I:

Introduction to cybercrime: Classification of cybercrimes – reasons for commission of cybercrime – malware and its type – kinds of cybercrime – authentication – encryption – digital signatures – antivirus – firewall – steganography – computer forensics – why should we report cybercrime – introduction counter cyber security initiatives in India – generating secure password – using password manager-enabling two-step verification – security computer using free antivirus.

UNIT – II:

Tips for buying online: Clearing cache for browsers – wireless LAN-major issues with WLAN-safe browsing guidelines for social networking sites – email security tips – introduction-smart phone security guidelines – purses, wallets, smart phones – platforms, setup and installation-communicating securely with a smart phone.

UNIT – III:

Cyber investigation roles**:** Introduction – role as a cybercrime investigator – the role of law enforcement officers – the role of the prosecuting attorney – incident response: introduction-post mortem versus live forensics – computer analysis for the hacker defender program-network analysis – legal issues of intercepting Wi-Fi transmission – Wi-Fi technology – Wi-Fi RF-scanning RF – eavesdropping on Wi-Fi – fourth amendment expectation of privacy in WLAN.

UNIT – IV:

Seizure of digital information: introduction – defining digital evidence – digital evidence seizure methodology – factors limiting the wholesale seizure of hardware – other options for seizing digital evidence – common threads within digital evidence seizure – determining the most appropriate seizure method– conducting cyber investigations– demystifying computer/cyber crime – IP addresses – the explosion of networking – interpersonal communication.

UNIT – V:

Digital forensics and analyzing data: introduction – the evolution of computer forensics– phases of digital forensics-collection – examination-analysis – reporting – Cyber crime prevention: Introduction – crime targeted at a government agency.

TEXT BOOKS:

1. Dr. Jeetendra Pande, ***Introduction to Cyber Security*** Published by Uttarakhand Open University, 2017.(Chapter: 1.2-6.4,9.3-12.2)
2. Anthony reyes, Kevin o'shea, Jim steele, Jon R. Hansen, Captain Benjamin R. Jean Thomas Ralph, ***Cyber-Crime Investigations - Bridging the Gaps Between Security Professionals, Law Enforcement, and Prosecutors***, 2007.(Chapter: 4, 5, 6, 7, 8, 9,10)

REFERENCE BOOKS::

1. ***Cyber Security for Dummies***, Joseph Steinberg, Wiley, 2020.
2. ***Computer Forensics and Investigations***, Nelson Phillips and Enfinger Steuart, Cengage Learning, New Delhi, 2009.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- **https://www.w3schools.com/cybersecurity/index.php**
- **https://intellipaat.com/blog/tutorial/ethical– hacking– cyber– security– tutorial/**

Mapping of CO with PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	3	3	3	3
CO2	3	3	3	3	2	3
CO3	2	2	2	2	2	3
CO4	3	3	3	3	3	3
CO5	2	3	3	3	3	3

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAEP1	INTERNET OF THINGS LAB	ELECTIVE – 1I - I PEC	-	4	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course teaches a deep understanding of IoT technologies from the ground up. Students will learn IoT device programming (Arduino and Raspberry Pi), sensing and actuating technologies.

COURSE OBJECTIVES:

- To familiarize the students to the basics of Internet of things and protocols.
- To expose the students to some application areas where Internet of Things can be applied.
- To create web server program for local hosting.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the concept of Internet of Things	Upto K5
CO 2	implement interfacing of various sensors with Arduino/Raspberry Pi.	Upto K5
CO 3	demonstrate the ability to transmit data wirelessly between different devices.	Upto K5
CO 4	show an ability to upload/download sensor data on cloud and server.	Upto K5
CO 5	design IoT application for various fields	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4-ANALYSE, K5– EVALUATE

INTERNET OF THINGS LAB

EXERCISES:

1. To develop an IoT program to turn ON/OFF LED light (3.3V)
2. To develop an IoT program using IR sensor (Smart Garbage Monitoring, Detecting Parking Availability, etc.)
3. To develop an IoT program using Humidity and Temperature Monitoring (Forest fire Detection, Weather Monitoring)
4. To develop an IoT web server program for local hosting
5. To develop an IoT program using Soil Moisture Sensor
6. To develop an IoT program using Ultrasonic Sensor (Distance Measurement, etc.)
7. To develop a real-time IoT program using Relay Module (Smart Home Automation with 230V)
8. To develop an IoT program for Fire Detection (Home, Industry, etc.)
9. To develop an IoT program for Gas Leakage detection (Home, Industry, etc.)
10. To develop an IoMT program using Heartbeat Sensor

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://vemu.org/uploads/lecture_notes/15_02_2023_57975631.pdf
- https://www.ucpesbam.in/public/images/lab_manuals_pdf/IOT%20Lab%20Manual%20(1)_compressed.pdf
- https://www.nitttrchd.ac.in/imee/Labmanuals/manual%20Internet%20of%20Things%20I.pdf

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	3
CO2	3	3	3	3	3	2
CO3	3	2	3	2	2	3
CO4	3	3	3	2	3	2
CO5	3	3	3	3	2	2

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAEP2	DIGITAL MARKETING LAB	ELECTIVE - I1 - II PEC	-	4	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

In this Digital Marketing Lab, student will delve into the practical applications of Digital Marketing for executing successful marketing campaigns in the digital realm. Learn how to effectively leverage Digital Marketing tools to gain a competitive edge in today's dynamic market landscape. Gain insights into consumer purchasing behavior through the power of Web Analytics, enabling you to tailor your product or service offerings to precisely match the needs of your target audience.

COURSE OBJECTIVES:

- To learn digital marketing tools like search engine optimization and associated analytics.
- To apply digital marketing tools to improve websites' rankings and optimize it in the process, the brand's visibility and brands reach which physically is relatively difficult and less effective.
- To analyze relative importance of digital marketing strategies to optimize digital marketing campaign.
- To evaluate the performance of different social media in conjunction with overall digital marketing plan.
- To design search engine optimization and search engine marketing campaigns.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the concept of digital marketing and its integration with traditional marketing.	Upto K5
CO 2	understand customer value journey in digital context and behaviour of online consumers.	Upto K5
CO 3	understand email, content and social media marketing and apply the learnings to create digital media campaigns.	Upto K5
CO 4	examine various tactics for enhancing a website's position and ranking with search engines.	Upto K5
CO 5	leverage the digital strategies to gain competitive advantage for business and career.	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

DIGITAL MARKETING LAB

EXERCISES:

1. Implementation of Digital Marketing in Business Scenario.
2. Create the Digital Marketing Webpage.
3. Conducting the Search Engine Optimization and Search Engine Marketing.
4. Analyze website performance by using Google Analytics.
5. Creating promotional banner through Canva.
6. Facebook promotion using banners.
7. Creating YouTube Channel for Marketing
8. Twitter Marketing.
9. Instagram Marketing.
10. Email Marketing.
11. Creating Digital Marketing Final Analysis and Report.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://www.cuchd.in/usb/business– management/brochure/Digital– Marketing– Lab– Manual.pdf
- https://www.studocu.com/in/document/i– k– gujral– punjab– technical– university/computer– application– i/e– commerce– and– digital– marketing/43943713
- https://www.sbtdc.org/pdf/digitalmarketingguide.pdf

Mapping of CO with PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3				3	1
CO2	2		3		3	1
CO3	1			2	2	3
CO4			3		3	2
CO5	1				2	2

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAEP3	CYBER SECURITY LAB	ELECTIVE - I1 – III PEC	-	4	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

To make the students vulnerability test and penetration test in the security testing system. To make the students Understand the basics of Computer forensics fundamentals. To make the students analyze various computer forensics technologies and to provide computer forensics systems.

COURSE OBJECTIVES:

- To learn and implement to Change the wireless device mode as monitor mode
- To develop in multiple vulnerabilities web server
- To understand and implement the open ports in the network
- To acquire programming skills in Implement various wireless device modes
- To comprehend related to find the sub domains of webpage

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	comprehend the programming skills in Change the wireless device mode as monitor mode	Upto K5
CO 2	understand and implement multiple vulnerabilities web server	Upto K5
CO 3	evaluate the use of different wireless device modes	Upto K5
CO 4	design to Solve related to find the sub domains of webpage	Upto K5
CO 5	create and apply open ports in the network	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

CYBER SECURITY LAB

Implement the following using any cyber security tools

1. Install virtual box (kali Linux)
2. Generate a secure password using keepass
3. Change the wireless device mode as monitor mode
4. Find the known and open vulnerabilities of system using metaspolit
5. Identify the multiple vulnerabilities webserver using nikto tool
6. Identify the open ports in the network using nmap tools
7. List all the network around us and display the information about the networks
8. Sniff and capture the packet sent over HTTP requests
9. Find the owners of internet resources using Whois Lookup tool
10. Find the sub domains of webpage using knock tool

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://github.com/frankwxu/digital– forensics– lab
- https://www.kitploit.com/2021/11/digital– forensics– lab– free– hands– on.html
- https://www.scribd.com/document/680034705/Cyber– Forensics– Lab– Manual

Mapping of CO with PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	-	-	-	-	1
CO2	3	-	2	-	2	1
CO3	3	-	3	-	3	1
CO4	3	-	3	-	3	1
CO5	3	-	3	-	3	1

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE STRUCTURE – II SEMESTER

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	24MCAC21	**Core – 6: PCC** Advanced Java Programming	5	3	25	75	100	5
2.	24MCAC22	**Core – 7: PCC** Linux and Shell Programming	5	3	25	75	100	5
3.	24MCACP3	**Core – 8: PCC** Advanced Java Programming Lab	5	3	40	60	100	3
4.	24MCACP4	**Core – 9: PCC** Linux and Shell Programming Lab	5	3	40	60	100	3
5.	**Elective – III: PEC**		4	3	25	75	100	4
	24MCAE21	Big Data Analytics						
	24MCAE22	Social Media Marketing						
	24MCAE23	Cryptography						
6.	**Elective – IV: PEC**		4	3	40	60	100	2
	24MCAEP4	Big Data Analytics Lab						
	24MCAEP5	Social Media Marketing Lab						
	24MCAEP6	Cryptography Lab						
7.		**Core – 10: PCC:** Internship/ Mini– Project	-	-	-	-	-	-
8.		***SWAYAM/NPTEL**	–	–	–	100	100	1
		Total	**30**				**700**	**24**

CA – Class Assessment (Internal)
SE – End Summative Examination
SEC – Skill Enhancement Course
PCC – Professional Competency Course (Core)
PEC – Professional Elective Course (Elective)
T – Theory
P – Practical

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAC21	ADVANCED JAVA PROGRAMMING	CORE – 6 PCC	5	-	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course will equip the students with the required knowledge and skill of object-oriented programming approach needed for the development of robust, powerful web applications. Through this course students will get hands-on experience on GUI Technologies viz. AWT and Swings, event handling mechanisms and network programming. The course also gives coverage to various web applications aspects like Database Interaction, server-side components and servlets.

COURSE OBJECTIVES:

- To gain knowledge of Object-Oriented Programming Concept in Java
- To understand usages of String functions in Java
- To familiarize with the applet and swing
- To grasp the concepts on Java Beans
- To comprehend the connection between Relational Database and Java.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the Object-Oriented Program including classes and methods; inheritance and exception handling	Upto K5
CO 2	complete comprehension of String functions and I/O Streams	Upto K5
CO 3	create graphical representation using Applet	Upto K5
CO 4	application of Servlets for designing Web based applications	Upto K5
CO 5	use JDBC connectivity and implementation of the concept to get desired results from database	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

ADVANCED JAVA PROGRAMMING

UNIT – I:

An Overview of Java: Object Oriented Programming- Data Types, Variables, and Arrays: Primitive Types-Literals Variables - Type Conversion and Casting- Arrays-Operators: Control Statements-Classes and Methods – Inheritance- Exception Handling.

UNIT – II:

String Handling: The String Constructors - String Length - Special String Operations - Character Extraction - String Comparison - Searching Strings - Modifying a String - Input/Output: The I/O Classes and Interfaces – File - Byte Streams - Character Streams.

UNIT – III:

The Applet Class: Basic Architecture - Applet Skeleton - Display methods - Status Window – Passing Parameters. Introducing GUI Programming with Swing– Introducing Swing - Swing Is Built on the AWT- Two Key Swing Features - The MVC Connection - Components and Containers - The Swing Packages - A Simple Swing Application - Exploring Swing.

UNIT- IV:

Java Beans: Introduction - Advantages of Beans – Introspection - The JavaBeans API - A Bean Example. Servlets: Life Cycle Simple Servlet-Servlet API-Packages-Cookies session tracking.

UNIT – V:

Network Programming: Working with URLs- Working with Sockets - Remote Method Invocation. Introduction to Database Management Systems - Tables, Rows, and Columns - Introduction to the SQL SELECT Statement - Inserting Rows - Updating and Deleting Existing Rows - Creating and Deleting Tables - Creating a New Database with JDBC - Scrollable Result Sets.

CASE STUDY: Student may submit a simple project using the Java Framework

Java Framework: Introduction to MVC1 & MVC2 Architecture - Overview of Struts Framework - Components of Model, View & Controller - Action Classes - Handling Application Requests - Generating Dynamic Views - Validating User Input - Validator Plug-in - Working with Tiles - Deployment Descriptors. Introduction to Spring Framework - Spring Framework Architecture - Spring bean wiring - AOP with Spring - Transactions management - Spring with database. Introduction to Hibernate - Object Related Mapping - Persistent Classes - Mapping Collections - Hibernate Query language - Caching and Transactions - Hibernate with web applications.

TEXT BOOKS:

1. Herbert Schildt, "Java the Complete Reference", 10th edition, McGraw Hill Publishing Company Ltd, New Delhi, 2017.
2. Tony Goddis, "Starting out with Java from Control Structures Through Objects" 6th Edition, Pearson Education Limited, 2016

REFERENCE BOOKS:

1. Herbert Schildt, Dale Skrien, "Java Fundamentals – A Comprehensive Introduction", TMGH Publishing Company Ltd, New Delhi, 2013
2. John Dean, Raymond Dean, "Introduction to Programming with JAVA – A Problem Solving Approach", TMGH Publishing Company Ltd, New Delhi,2012.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- http://java.sun.com
- http://www.oracle.com/technetwork/java/index.html
- http://java.sun.com/javase
- http://www.oracle.com/technetwork/java/javase/overview/index.html
- http://download.oracle.com/javase/7/docs/api/index.html
- https://www.geeksforgeeks.org/java-projects-with-source-code/

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	–	–	–	–	1
CO2	3	–	2	–	2	1
CO3	3	–	3	–	3	1
CO4	3	–	3	–	3	1
CO5	3	–	3	–	3	1

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAC22	LINUX AND SHELL PROGRAMMING	CORE – 7 PCC	5	-	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓		

COURSE DESCRIPTION:

The goal is to familiarize students with the fundamental inner workings and functionalities of the LINUX operating system, enabling them to create system programs utilizing system calls and introducing them to utilities and Shell Programming.

COURSE OBJECTIVES:

- To learn principles of operating system including File handling utilities, Basic Linux commands, Scripts and filters.
- To familiarize fundamentals of shell (bash), shell programming, pipes, Control structures, arithmetic in shell interrupt processing, functions, debugging shell scripts.
- To impart fundamentals of shell (bash), shell programming, pipes, Control structures, file concepts, kernel support for file, file structure related system calls (file API's).
- To facilitate students in understanding Inter process communication, semaphore and shared memory.
- To explore real– time problem solution skills in Shell programming.

COURSE OUTCOMES (COs):

On the successful completion of the course, students will be able

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand, apply and analyze the concepts and methodology of Linux shell programming	Upto K5
CO 2	comprehend, impart and apply fundamentals of control structure and script controls	Upto K5
CO 3	understand, analyses and evaluate the functions, graphical desktop interface and editors	Upto K5
CO 4	collaborate, apply and review the concepts and methodology of regular expression and advanced gawk	Upto K5
CO 5	comprehend, use and illustrate the advance concepts such as alternate shell script, data connectivity and bash scripting using python	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

LINUX AND SHELL PROGRAMMING

UNIT– I:

Basic bash Shell Commands: Interacting with the shell– Traversing the file system– Listing files and directories– Managing files and directories– Viewing file contents. **Basic Script Building:** Using multiple commands– Creating a script file– Displaying Messages– Using Variables– Redirecting input and output– Pipes– Performing Math– Exiting the script. **Using Structured Commands:** Working with the if– then statement– Nesting if – Understanding the test command– Testing compound conditions– Using double brackets and parentheses– Looking at case. (Chapters: 3, 11, and 12)

UNIT– II:

More Structured Commands: Looping with for statement– Iterating with the until statement– Using the while statement– Combining loops – Redirecting loop output. **Handling User Input:** Passing parameters – Tracking Parameters– Being shifty – Working with options– Standardizing options – Getting user input.

Script Control: Handling signals – Running scripts in the background– Forbidding hang–ups – Controlling a Job– Modifying script priority– Automating script execution.
(Chapters: 13, 14, and 16)

UNIT– III:

Creating Functions: Basic script functions– Returning a value– Using variable in functions– Array and variable functions– Function Recursion– Creating a library– Using functions on the command line.

Writing Scripts for Graphical Desktops: Creating text menus– Building text window widgets– Adding X Window graphics.

Introducing sed and gawk: Learning about the sed Editor– Getting introduced to the gawk Editor– Exploring sed Editor basics. (Chapters: 17, 18, and 19)

UNIT– IV:

Regular Expressions: Defining regular expressions– Looking at the basics– Extending our patterns– Creating expressions. **Advanced sed:** Using multiline commands– Understanding the hold space– Negating a command– Changing the flow– Replacing via a pattern– Using sed in scripts– Creating sed utilities. **Advanced gawk:** Reexamining gawk – Using variables in gawk– Using structured commands– Formatting the printing– Working with functions. (Chapters: 20, 21, and 22)

UNIT– V:

Working with Alternative Shells: Understanding the dash shell– Programming in the dash shell– Introducing the zsh shell– Writing scripts for zsh. **Writing Simple Script Utilities:** Automating backups– Managing user accounts– Watching disk space. **Producing Scripts for Database, Web, and E– Mail:** Writing database shell scripts– Using the Internet from your scripts– Emailing reports from scripts. (Chapters: 23, 24, 25)

TEXT BOOKS:

Richard Blum, Christine Bresnahan, ***Linux Command Line and Shell Scripting,*** BIBLE, Wiley Publishing, 3rd Edition, 2015. (**Chapters:** 3, 11 to 14, 16 to 25.)

REFERENCE BOOKS:

1. Clif Flynt, Sarath Lakshman, Shantanu Tushar, ***Linux Shell Scripting Cookbook***, Packt Publishing, 3rd Edition, 2017.
2. Stephen G.Kochan, Patrick Wood, ***Shell Programming in Unix, Linux, and OS X***, Addison Wesley Professional, 4th Edition, 2016.
3. Robert Love, ***Linux System Programming***, O'Reilly Media, Inc, 2013

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- **https://mis.alagappauniversity.ac.in/siteAdmin/dde–admin/uploads/5/__PG_BCA_Computer%20Applications_10154%20BCA%20UNIX%20&%20SHELL%20PROGRAMMING%20LAB%20FINAL_3555.pdf**
- **https://archive.org/details/0314– pdf– blum– linux– command– line– and– shell– scripting– bible– wiley– 2008/page/n9/mode/2up**
- **https://www.lpude.in/SLMs/Master%20of%20Computer%20Applications/Sem_1/DECAP448_LINUX_AND_SHELL_SCRIPTING.pdf**

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	–	3	1
CO2	3	3	2	–	3	1
CO3	3	3	2	–	3	1
CO4	3	3	2	–	3	1
CO5	3	3	2	–	3	1

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE DESIGNER: Dr. K. ANURATHA

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCACP3	ADVANCED JAVA PROGRAMMING LAB	CORE – 8 PCC	-	5	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	✓

COURSE DESCRIPTION:

This Java course aims to introduce the students to some concepts of advanced programming and practice on reusing components. The course covers Graphical User Interface (GUI), networking, and database manipulation. Student will learn how to work with JavaBeans.

COURSE OBJECTIVES:

- To gather the knowledge regarding OOPS and Programming exposure.
- To study the enabling technologies for building internet applications.
- To learn packages, access specifies and interfaces in program.
- To train program for events and interactivity using Layout Manager.
- To study program for network chatting and database connectivity.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	implement classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem	Upto K5
CO 2	create a full set of UI widgets and other components using Abstract Windowing Toolkit	Upto K5
CO 3	apply event handling on AWT and Swing components	Upto K5
CO 4	make a reusable software component, using Java Bean.	Upto K5
CO 5	learn to access database through Java programs, using Java Data Base Connectivity (JDBC)	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

ADVANCED JAVA PROGRAMMING LAB

LIST OF PROGRAMS:

1. Implement basic java concepts.
2. Generate a salary for an employee using class, object, constructors, methods and
    1. access control. Different parameters to be considered are Emp_No, Emp_Name,
    2. Age, Basic, DA, HRA, CA, PT, IT.
3. Generate a sales report for a sales executive using class, object, constructors,
    1. methods and access control. Different parameters to be considered are Emp_No,
    2. Emp_Name, Sales_Q1, Sales_Q2, Sales_Q3, Sales_Q4.
4. Demonstrate Constructor Overloading and Method Overloading.
5. Implement Inner class and demonstrate its Access protection.
6. Write a program in Java for String handling which performs the following:
   Checks the capacity of String Buffer objects.
   Reverses the contents of a string given on console and converts the resultant
    1. string in uppercase.
   Reads a string from console and appends it to the resultant string.
7. Demonstrate Inheritance.
8. Simple Program on Java for the implementation of Multiple inheritance using
    1. interfaces to calculate the area of a rectangle and triangle.
9. Write a JAVA program which has
   A Class called Account that creates account with 500Rs minimum balance, a
    1. deposit() method to deposit amount, a withdraw() method to withdraw amount
    2. and also throws Less Balance Exception if an account holder tries to withdraw
    3. money which makes the balance become less than 500Rs.
10. A Class called Less Balance Exception which returns the statement that says
    1. withdraw amount (Rs) is not valid.
11. A Class which creates 2 accounts, both account deposit money and one account
    1. tries to withdraw more money which generates a Less Balance Exception take
    2. appropriate action for the same.
12. Write a JAVA program using Synchronized Threads, which demonstrates
    1. Producer Consumer concept.
13. Write a JAVA program to implement a Queue using user defined Exception
    1. Handling (also make use of throw, throws.).
14. Complete the following:
    1. Create a package named shape.
   Create some classes in the package representing some common shapes like
    2. Square, Triangle and Circle. Import and compile these classes in other program.

15. Write a JAVA Program to create an enumeration Day of Week with seven values
    1. SUNDAY through SATURDAY. Add a method is Workday( ) to the
    2. Day of Week class that returns true if the value on which it is called is MONDAY
    3. through FRIDAY. For example, the call Day of Week. SUNDAY. Is Work Day ( )
    4. returns false.
16. Write a JAVA program which has an Interface class for Stack Operations
17. Print a chessboard pattern.
18. Write a JAVA Program which uses File Input Stream / File Output Stream Classes.
19. Write a JAVA applet program, which handles keyboard event.
20. Write a JAVA Swing program, to design a form.
21. Create a simple Student_Registration application using Swings, JDBC and MySQL.
22. Write a JAVA program which uses Datagram Socket for Client Server Communication
23. Implement message communication using Network Programming.
24. Write a program to connect databases using JDBC.
25. Implementation of Java Beans.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://mrcet.com/pdf/Lab%20Manuals/IT_II%20B.TECH%20SEM%20–II%20JAVA%20%20LAB%20MANUAL%20(20– 21).pdf
- https://www.bharathuniv.ac.in/downloads/csc/BCS6L3–Programming%20in%20Java%20Lab.pdf
- https://svrec.ac.in/docs/CSE/lab_manuals/JAVA%20LAB%20MANUAL.pdf
- http://khitguntur.ac.in/csemat/JAVA%20LAB%20MANUAL.pdf

Mapping of CO with PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	3
CO2	3	2	3	3	3	2
CO3	3	3	3	3	3	3
CO4	3	2	3	3	3	2
CO5	3	3	3	3	3	3

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCACP4	LINUX AND SHELL PROGRAMMING LAB	CORE – 9 PCC	-	5	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	I	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	✓

COURSE DESCRIPTION:

In this course basics of shell programming are dealt. Shell programs to understand the operating environment of Linux are practiced. An exposure to system calls types of process and inter process communication issues are dealt with practical exercises.

COURSE OBJECTIVES:

- To enable the students to study and understand the efficiency of Linux shell script.
- To demonstrate the File Backup process.
- To develop and implement the shell script for GUI processing.
- To develop and implement the shell script for IPC and Networking.
- To demonstrate PostgreSQL

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand, apply and analyze the concepts and methodology of Linux shell programming	Upto K5
CO 2	comprehend, impart and apply fundamentals of control structure and script controls	Upto K5
CO 3	understand, analyses and evaluate the functions, graphical desktop interface and editors	Upto K5
CO 4	collaborate, apply and review the concepts and methodology of regular expression and advanced gawk	Upto K5
CO 5	comprehend, use and analyze the advance concepts such as alternate shell script, dy and bash scripting using PostgreSQL	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

LINUX AND SHELL PROGRAMMING LAB

LIST OF PROGRAMS:

1. Shell Script to implement basic commands.
2. Shell Script program to check systems on local network using control structures with user input.
3. Shell Script program to check systems on local network using control structures with file input.
4. Shell Script program to demonstrate the script control commands.
5. Shell Script program to demonstrate the Shell script function.
6. Shell Script program to demonstrate the Regular Expressions.
7. Shell Script program to demonstrate the sed and awk Commands.
8. Shell Script program to demonstrate the File Backup process through creating a daily archive location.
9. Shell Script program to create a following GUI tools.
   Creating text menus
   Building text window widgets
10. Shell Script program to demonstrate to connect a PostgreSQL database and performing CRUD operations.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://mrcet.com/pdf/Lab%20Manuals/CSE/LINUX%20PROGRAMMING%20LAB.pdf
- https://www.cmrec.ac.in/downloads/academic2017-18/cse/lab/iv/lp.PDF
- https://www.nrcmec.org/pdf/Manuals/CSE/student/4-1%20lp16-17.pdf

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	-	3	-
CO2	3	3	3	-	3	-
CO3	3	3	3	-	3	-
CO4	3	3	3	-	3	-
CO5	3	3	3	-	3	-

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAE21	BIGDATA ANALYTICS	ELECTIVE - II1 – I PEC	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓		

COURSE DESCRIPTION:

This course gives an overview of Big Data, i.e. storage, retrieval and processing of big data. In addition, it also focuses on the "technologies", i.e., the tools/algorithms that are available for storage, processing of Big Data.

COURSE OBJECTIVES:

- To introduce big data tools & Information Standard formats and the basic concepts of big data.
- To teach the importance of NoSQL.
- To learn Hadoop, HDFS and MapReduce concepts.
- To explore the big data tools such as Hive, HBase and Pig.
- To demonstrate Recommendation Systems.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand, illustrate and evaluate the concepts and techniques of Data Science, Big Data Analytics and its tools	Upto K5
CO 2	collaborate, apply and review the computing for big data in Hadoop, and NoSQL environment.	Upto K5
CO 3	comprehend, implement and review the concepts of data science and big data analytics projects using MapReduce, and MongoDB	Upto K5
CO 4	understand, use and analyze the concepts of big data analytics projects using HIVE and PIG database.	Upto K5
CO 5	describe types of Recommendation Systems using Big Data Analytics.	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

BIGDATA ANALYTICS

UNIT I

Big Data and Analytics: Classification of Digital Data: Structured Data- Semi Structured Data and Unstructured Data. Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data - Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop.
Environment Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments – Basically Available Soft State Eventual Consistency - Top Analytics Tools

UNIT II

Technology Landscape: NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

UNIT III

Mongodb and Mapreduce Programming: MongoDB: Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language. MapReduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression

UNIT IV

Hive: Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements – Partitions – Bucketing – Views - Sub- Query – Joins – Aggregations - Group by and Having – RCFile - Implementation - Hive User Defined Function - Serialization and Deserialization. **Pig:** Introduction - Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - Piggy Bank - User-Defined Functions - Parameter Substitution – Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive

UNIT – V:

RECOMMENDATION ENGINES – Introduction to Recommendation Engines: Recommendation engine definition – Need for Recommender Systems – Big Data Driving the Recommender Systems –Types of Recommender Systems –Evolution of Recommender Systems with Technology. Evolution of Recommendation Engines Explained: Evolution of Recommendation Engines – Nearest Neighborhood– based Recommendation Engines – Content– based Recommender Systems – Hybrid Recommender Systems – Model– based Recommender Systems.

TEXT BOOKS:

1. ***Big Data and Analytics***, Seema Acharya and Subhashini Chellappan, 2nd edition, Wiley India Private Limited, 2017.
2. ***Building Recommendation Engines*. –** Suresh Kumar Gorakala, 1st edition, Packt Publishing Limited, United Kingdom, 2016

REFERENCE BOOKS:

1. ***Big Data Strategies***, Pam Baker, 1st edition, Cengage Learning India Private Limited, 2016.

2. ***Big Data***, Dr. Anil Maheshwari, 1st edition, Published by McGraw Hill Education (India) Private Limited, 2017.
3. ***Big Data Fundamentals Concepts, Driver & Techniques***, Thomas Erl, Wajid Khattak and Paul Buhler, 3rd Edition, Pearson publication, 2018.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://www.tutorialspoint.com/big_data_analytics/index.html
- https://www.edureka.co/blog/big– data– tutorial
- https://www.tutorialride.com/big– data– analytics/big– data– analytics– tutorial.html
- https://www.guru99.com/bigdata– tutorials.html

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	-	-	-	-	1
CO2	3	-	2	-	2	1
CO3	3	-	3	-	3	1
CO4	3	-	3	-	3	1
CO5	3	-	3	-	3	1

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAE22	SOCIAL MEDIA MARKETING	ELECTIVE - 1II – II PEC	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓		

COURSE DESCRIPTION:

This course introduces students to a variety of existing, new and emerging concepts, strategies, and technologies utilized in today's online environment. It covers various social networking platforms, content, and tools, and related security and privacy issues in social media. Students will learn how to use social media to reach personal and professional goals.

COURSE OBJECTIVES:

- To learn about Social media, Social networking and Webcasts
- To understanding and building a Word Press Powered Website
- To analysis the Social Networking & Micro– Blogging.
- To learn and analysis the Widgets & Badges.
- To explore the importance of Website optimization.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand, impart and summarize the concepts of Social media, Social networking and Webcasts	Upto K5
CO 2	comprehend, design and develop a Word Press Powered Website	Upto K5
CO 3	understand, implement and perform evaluation of Social Networking and Micro– Blogging	Upto K5
CO 4	collaborate, implement and analyse the Widgets and Badges in social networking environment	Upto K5
CO 5	understand, illustrate and perform evaluation of web optimization for social networks	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

SOCIAL MEDIA MARKETING

UNIT – I:

Introduction: Social Media Strategy– Important First Decisions – Websites, Blogs – RSS Feeds Mapping – Preparation – Multimedia Items Gathering Content for Blog Posts RSS Feeds & Blogs– RSS Feeds– The Feed Reader– The Feed– Options for Creating an RSS Feed– Planning Feed– Blogs– Options for Starting. Blog and RSS Feed– Feed or Blog Content– Search Engine Optimization (SEO) – Feed Burner– RSS Feed and Blog Directories– An Optimization Plan for Blog or RSS Feed

UNIT – II:

Building a Word Press Powered Website: Word Press as A CMS – Diversity of Word Press Sites– The Anatomy of a Word Press Site – a Brief Look at the Word Press Dashboard Planning – Site Themes Plug– ins setting up Sidebars Building Pages – Posting Blog Entries. Podcasting, Vidcasting, & Webcasting – Publishing Options for Podcast – Creating and Uploading Podcast Episodes – Publishing Podcast Optimizing Podcast – Webcasting

UNIT – III:

Social Networking & Micro– Blogging: Facebook– The Facebook Profile – Myspace LinkedIn– Twitter– Niche Social Networking Sites– Creating Own Social Network– Promoting Social Networking Presence– Social Bookmarking & Crowd– Sourcing – Social Bookmarking– A Social Bookmarking Strategy– Crowd– Sourced News Sites– Preparation And Tracking Progress Media Communities– Image Sharing Sites– Image Sharing Strategy– Video Sharing Sites– Video Sharing Strategy– Searching And Search Engine Placement– Connecting With Others

UNIT – IV:

Widgets & Badges: Highlighting Social Web Presence– Sharing And Syndicating Content Making Site More Interactive– Promoting Products And Making Money– Using Widgets In Word Press– Widget Communities And Directories– Working Widgets Into Strategy Social Media Newsrooms– Building Social Media Newsroom – Populating The Newsroom– Social Media News Releases– Social Media Newsroom Examples. More Social Tools– Social Calendars– Social Pages Wikis– Social Search Portals– Virtual Worlds

UNIT – V:

Website optimization: A Website Optimization Plan– Streamlining Web Presence– An Integration Plan– Looking to the Future– Life streaming: The Future of Blogging– Distributed Social Networking– Social Ranking, Relevancy, and ―Defriending– Web 3.0 or The Semantic Web– Mobile Technology– Measuring Your Success– A Qualitative Framework– A Quantitative Framework– Tools to Help You Measure– Come To Your Own Conclusions

TEXT BOOK:

Deltina Hay ***—A Survival Guide To social Media and Web 2.0 Optimization***, Dalton Publishing, 2009

REFERENCE BOOKS:

1. Miriam Salpeter ***— Social Networking for Career Success Learning Express***, 2011.
2. Miles, Peggy, ***— Internet World Guide to Webcasting*** Wiley, 2008

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- **https://www.academia.edu/43633442/C21Social_Media**
- **https://nibmehub.com/opac– service/pdf/read/social% 20media% 20analytics% 20strategy%20_%20 using%20data%20to% 20optimize %20business%20performance.pdf**
- **https://digilib.stiestekom.ac.id/assets/dokumen/ebook/feb_1deaf4764b7016c926fa758495ad16595b700948_1654689504.pdf**

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	–	3	1
CO2	3	3	3	–	3	1
CO3	3	3	3	–	3	1
CO4	3	3	3	–	3	1
CO5	3	3	3	–	3	1

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAE23	CRYPTOGRAPHY	ELECTIVE - 1II – III PEC	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	✓

COURSE DESCRIPTION:

This course introduces the underlying the principles and design of cryptosystems. The course covers the basics concepts of cryptography including: traditional ciphers, block ciphers, stream ciphers, public and private key cryptosystems. The course also includes the theory of hash functions, authentication systems, network security protocols and malicious logic.

COURSE OBJECTIVES:

- To understand the fundamental principles of access control models and techniques, authentication and secure system design.
- To have a strong understanding of different cryptographic protocols and techniques and be able to use them.
- To apply methods for authentication, access control, intrusion detection and prevention.
- To identify and mitigate software security vulnerabilities in existing systems.
- To study symmetric– key encryption, stream ciphers, block ciphers, message authentication codes, asymmetric encryption (RSA– and discrete– log– based), and digital signatures.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	analyze and design classical encryption techniques and block ciphers	Upto K5
CO 2	understand and analyze data encryption standard.	Upto K5
CO 3	understand and analyze public– key cryptography, RSA and other public– key cryptosystems	Upto K5
CO 4	understand key management and distribution schemes and design User Authentication, such as Diffie–Hellman Key Exchange, ElGamal Cryptosystem, etc	Upto K5
CO 5	analyze and design hash and MAC algorithms, and digital signatures	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

CRYPTOGRAPHY

UNIT – I: INTRODUCTION

Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security.

CLASSICAL ENCRYPTION TECHNIQUES: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography.

UNIT – II: BLOCK CIPHERS AND THE DATA ENCRYPTION STANDARD

Block Cipher Principles, The Data Encryption Standard (DES), A DES Example, The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles. BLOCK CIPHER OPERATION: Multiple Encryption and Triple DES, Electronic Codebook Mode, Cipher Block Chaining Mode, Cipher Feedback Mode, Output Feedback Mode, Counter Mode. STREAM CIPHERS: Stream Ciphers, RC4.

UNIT – III: NUMBER THEORY

Divisibility and the Division Algorithm, The Euclidean Algorithm, Modular Arithmetic, Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms. PUBLIC– KEY CRYPTOGRAPHY, RSA AND OTHER PUBLIC– KEY CRYPTOSYSTEMS: Principles of Public– Key Cryptosystems, The RSA Algorithm, Diffie Hellman Key Exchange, ElGamal Cryptosystem.

UNIT – IV: CRYPTOGRAPHIC HASH FUNCTIONS

Applications of Cryptographic Hash Function, Two Simple Hash Functions, 195 G V P College of Engineering (Autonomous) 2013 Requirements and Security, Hash Functions Based on Cipher Block Chaining, Secure Hash Algorithm (SHA). MESSAGE AUTHENTICATION CODES: Message Authentication Requirements, Message Authentication Functions, Message Authentication Codes, Security of MACs, MACs Based on Hash Functions (HMAC).

UNIT – V: DIGITAL SIGNATURES

Digital Signatures, ElGamal Digital Signature Scheme, Schnorr Digital Signature Scheme, Digital Signature Standard (DSS).

KEY MANAGEMENT AND DISTRIBUTION: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public Key Infrastructure.

TEXT BOOKS

William Stallings: ***Cryptography and Network Security– Principles and Practice***, 5th Edition, Pearson/PHI, 2011.

REFERENCE BOOKS:

1. Buchmann: ***Introduction to Cryptography***, 2nd Edition, Springer, 2004.
2. Whitman: ***Principles of Information Security***, 3rd Edition, Thomson, 2009.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- http://www.nptel.iitm.ac.in/courses/106105031/

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	–	3	1
CO2	3	3	3	–	3	1
CO3	3	3	3	–	3	1
CO4	3	3	3	–	3	1
CO5	3	3	3	–	3	1

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAEP4	BIG DATA ANALYTICS LAB	ELECTIVE - IV – I PEC	-	4	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	✓

COURSE DESCRIPTION:

The primary objective of this course is to optimize business decisions and create a competitive advantage with Big Data analytics. This course will introduce the basics required to develop map reduce programs, derive business benefit from unstructured data.

COURSE OBJECTIVES:

- To teach the fundamental techniques for handling the big data tools.
- To familiarize the tools required to manage big data.
- To analyse big data using Hadoop, MapReduce, Hive, and Pig
- To teach the fundamental principles in achieving big data analytics with scalability and streaming capability
- To enable students to have skills that will help them to solve complex.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand and develop conceptually how Big Data is stored and implement it using different tools	Upto K5
CO 2	comprehend and implement programs for data storage in HDFS and table manipulation using Big Data tools in Hadoop environment	Upto K5
CO 3	understand and Critically analyse existing Big Data datasets and implementations the solutions for it using MongoDB	Upto K5
CO 4	understand and examine existing Big Data datasets and implementations the solutions using HIVE database	Upto K5
CO 5	comprehend and review existing datasets and implementations the solutions to handle it using PIG	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

BIG DATA ANALYTICS LAB

LIST OF PROGRAMS:

1. Implement File System Shell Commands for HDFS in Hadoop Environment
2. Write a Mapreduce program using single reduce function for finding Maximum and Minimum Number
3. Write a Mapreduce program using multiple reduce function for Word Count in an given Text document
4. Implement the following using Pig Latin Input and Output Operations Relational Operations
5. Implement the following using Pig Latin User Defined Functions Advanced Relational Operations
6. Write a Word Count program using Pig Latin Script
7. Write a program to find a maximum temperature using Pig Latin Script
8. Implement the following using Hive commands Handling the Database Creating and Manipulating table
9. Implement Simple Queries for database using Mongo
10. Implement Simple Queries for collections using Mongo

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://mrcet.com/pdf/Lab%20Manuals/BIG%20DATA%20ANALYTICS%20Lab%20Manual.pdf
- https://cse.iitpkd.ac.in/courses/ds5102– Big– Data– Lab/#:~:text=The%20primary%20objective%20of%20this,business%20benefit%20from%20unstructured%20data.
- http://www.hadooplessons.info/2015/01/word– count– in– pig– latin.html
- http://deccancollege.ac.in/MCALABMANUALS/BIGDATALABMANUAL.pdf

Mapping of CO with PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	3
CO2	3	2	3	3	3	2
CO3	3	3	3	3	3	3
CO4	3	2	3	3	3	2
CO5	3	3	3	3	3	3

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAEP5	SOCIAL MEDIA ANALYTICS LAB	ELECTIVE - IV – II PEC	-	4	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	40	60	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	✓

COURSE DESCRIPTION:

In the Social Media Analytics Lab, students will gain the essential skills to harness the power of social media data for insightful analysis of organizations and their audiences. This course empowers students to provide actionable, data– driven recommendations and inform strategic decision– making in the realm of social media.

COURSE OBJECTIVES:

- To understand the role of social media data and analytics in helping organizations achieve their goals and understand their publics.
- To identify and select key performance indicators to accurately measure the success of social media efforts.
- To analyze social media data using native analytics (e.g. Facebook, Twitter, Instagram) and social media measurement tools.
- To develop social media measurement plans and analytics reports, and communicate findings and recommendations effectively.
- To explore the tools, techniques, and methodologies necessary to extract valuable insights, measure performance, and enhance social media strategies, equipping you with the expertise to thrive in the digital age.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	develop proficiency in collecting, processing, and analyzing social media data from various platforms.	Upto K5
CO 2	learn to extract meaningful insights from social media data to gain a deeper understanding of an organization's audience and performance.	Upto K5
CO 3	acquire the skills to make data– driven recommendations that inform and enhance social media strategies for organizations.	Upto K5
CO 4	understand key metrics and KPIs (Key Performance Indicators) relevant to social media analytics and measurement.	Upto K5
CO 5	gain insights into optimizing content strategies based on data– driven findings and audience preferences.	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

SOCIAL MEDIA ANALYTICS LAB

LIST OF PROGRAMS

1. Explore various Social Media platform (Facebook, Twitter, YouTube etc) and Social Media analytics tools (Facebook insights, google analytics netlytics etc)
2. Explore Social Media Analytics technique and engagement metrics (page level, post level, member level).
   Choose any social media platform and perform practical no :3,4,5 for the same
3. Perform Data Collection from any of the social media platform of your choice (Twitter, Facebook, LinkedIn, YouTube, Web blogs etc).
4. Perform Pre processing of the collected data and store it. Hint: Data Cleaning and Storage – Pre process, filter and store social media data for business (Using Python, etc).
5. Analyze and Visualize the Social Media Data collected (Reference to Prac 3 and 4) Hint: Can include analysis of competitor activities using data.
6. Perform Hyperlink Analytics (Extract, Analyze and Interpret Hyperlinks)
7. Perform Text Analytics (Extract Analyze textual context of Social media platform)
8. Perform Action Analytics (Analyze likes, mentions of a product, idea or service).
9. Perform location Analytics (Mine the location of people, data, resources & visualize them).
10. Analyze how Individual/Organization use Social Media and Social media privacy 10 policies. (Analyze anyone Individual or Organization/Business usage on different platforms and privacy policy settings)

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://www.studocu.com/in/document/university– of– mumbai/computer– engineering/sma– manual/56108486
- https://github.com/ArtaXerxess/Social– Media– Analytics– Lab/tree/main/sma%20lab%201

Mapping of CO with PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2		2	3
CO2	3	2	3	3	3	2
CO3	3	3	3	3	3	3
CO4	3	2	3	3	3	2
CO5	3	3	3	3	3	3

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCAEP6	CRYPTOGRAPHY LAB	ELECTIVE - IV – III PEC	-	4	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	40	60	100

NATURE OF COURSE	Employability ✓	Skill Oriented ✓	Entrepreneurship ✓

COURSE DESCRIPTION:

This course helps to understand the basic mathematical foundations of cryptography and, to gain insightful experience by working with fundamental cryptographic applications and to train in the art of design and analysis of information security protocols.

COURSE OBJECTIVES:

- To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.
- To explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
- To familiarize symmetric and asymmetric cryptography
- To apply methods for authentication, access control, intrusion detection and prevention.
- To identify and mitigate software security vulnerabilities in existing systems.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand computer security principles and discuss ethical issues for theft of information. Identify threat models and common computer network security goals	Upto K5
CO 2	explain various encryption algorithms, hashing functions, one– way authentication and public key cryptology.	Upto K5
CO 3	apply security principles to system design.	Upto K5
CO 4	identify and investigate network security threat.	Upto K5
CO 5	analyze firewalls, DOS attacks and defense types. Dramatize example scenarios in DNS and IPSec applications.	Upto K5

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

CRYPTOGRAPHY LAB

LIST OF PROGRAMS

1. Write a C/Java program to perform encryption and decryption using the following algorithms
    1. Ceaser cipher
    2. Substitution cipher
    3. Hill Cipher
2. Write a C/JAVA program to implement the DES algorithm logic.
3. Write a C/JAVA program to implement the Blowfish algorithm logic.
4. Write a C/JAVA program to implement the Rijndael algorithm logic.
5. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.
6. Write a Java program to implement RSA algorithm.
7. Implement the Diffie– Hellman Key Exchange mechanism using HTML and JavaScript.
8. Calculate the message digest of a text using the SHA– 1 algorithm in JAVA.
9. Calculate the message digest of a text using the MD5 algorithm in JAVA.

DIGITAL TOOLS:

Web links and Video Lectures (e– Resources):

- https://sriindu.ac.in/wp– content/uploads/2023/02/R18CSE41L1– Crytography– Network– Security– Lab.pdf
- https://www.stannescet.ac.in/cms/staff/qbank/CSE/Lab_Manual/IT8761– SECURITY%20LABORATORY– 590519304– IT8761%20security% 20labmanual.pdf
- https://www.vvitengineering.com/lab/odd/CS6711– Security– Lab– Manual.pdf

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2		2	3
CO2	3	2	3	3	3	2
CO3	3	3	3	3	3	3
CO4	3	2	3	3	3	2
CO5	3	3	3	3	3	3

3. Advanced Application 2. Intermediate Development 1. Introduction

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24MCACV1	INTERNSHIP/ MINI PROJECT			2	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	✓

COURSE DESCRIPTION:

This course aims to make the students understand the real time software development environment. The student should gain an in-depth knowledge in the selected problem, and the language/software, which is used by them.

COURSE OBJECTIVES:

- To solve simple real-time problems in the following fields Industry/Academic Institutions/Computer science.
- To help the students do project (Commercial or Technical) individually or combined.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	have hands of experience on innovation, record keeping, documentation etc. and promote them as entrepreneur.	Upto K5
CO 2	learn to develop solution and apply the technologies learnt during the course in the real-time projects.	Upto K5
CO 3	learn how to plan various work in the project development environments involving deadlines and teamwork.	Upto K5
CO 4	get a chance for preparing for main project.	Upto K5
CO 5	prepare technical report based on the project and deliver seminar on their work.	Upto K5

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	3
CO2	3	3	2	3	2	3
CO3	3	3	2	3	2	3
CO4	2	2	2	2	2	2
CO5	3	3	2	3	2	3

3. Advanced Application 2. Intermediate Development 1. Introduction