LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING(AUTONOMOUS)
Accredited by NAAC with 'A' Grade
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. B. Rajendra Prasad
Course Name & Code : Digital Logic &Computer Organization & 20IT01
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : II B.Tech., IV-Sem, A-Sec **A.Y.: 2024-25**

Prerequisites:

Course Objectives: The main objectives of the course

1. Provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals.
2. Describe memory hierarchy concepts.
3. Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices.

COURSE OUTCOMES (COs): At the end of the course, students will be able to

CO1	Evaluate digital number systems and use Boolean algebra theorems, Properties and Canonical forms for digital logic circuit design. **(Understand- L2)**
CO2	Design Sequential logic circuits and understand basic functional blocks a computer system. **(Apply- L3)**
CO3	Understand computer architecture and Data representation to perform computer arithmetic operations and processor organization. **(Understand- L2)**
CO4	Analyze the memory hierarchy in a computer system. **(Understand- L2)**
CO5	Understand the I/O operations and the interfaces **(Understand-L2)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

CO	Program Outcomes (POs)												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	1	1	-	-	-	-	-	-	-	-	1	1	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO3	3	3	1	-	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	2	2	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	1	1

Textbooks:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 6th edition, McGraw Hill
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education.
3. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.

Reference Books:

1. Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson
2. Computer Organization and Design, David A. Paterson, John L.Hennessy, Elsevier
3. Fundamentals of Logic Design, Roth, 5thEdition, Thomson

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Number systems, Logic gates and Boolean algebra

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to course Cos, POs and PSOs	1	02-12-2025		TLM1	
2.	Introduction to DLD, Number systems	1	02-12-2025		TLM2	
3.	Different Number systems	1	05-12-2025		TLM2	
4.	Conversions of one number to another number	1	06-12-2025		TLM2, TLM4, TLM7	
5.	Data Representations	1	09-12-2025		TLM2	
6.	**TUTORIAL-1**	1	09-12-2025		TLM3	
7.	Binary codes	1	12-12-2025		TLM2	
8.	Basic Logic gates and Universal gates	2	13-12-2025 16-12-2025		TLM2	
9.	Boolean Logic functions	2	19-12-2025 20-12-2025		TLM2	
10.	K-Maps Simplifications	2	23-12-2025 26-12-2025		TLM2	
11.	Combinational circuits	1	27-12-2025		TLM2	
12.	Designing Decoder and Multiplexers	1	30-12-2025		TLM2	
13.	Assignment / Quiz	1	02-01-2026		TLM6	
No. of classes required to complete UNIT-I: 18				**No. of classes taken:**		

UNIT-II: Combinational Logic Circuits and Sequential Logic Circuits

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Introduction to sequential circuits,	1	02-01-2026		TLM2	
15.	Flip-flops(RS,JK,T,D),	2	03-01-2026		TLM2, TLM6	
16.	Master slave flip-flop	1	06-01-2026		TLM1, TLM2	
17.	Conversion of flip-flops, Truth & excitation tables	2	06-01-2026		TLM1, TLM2, TLM7	
18.	**TUTORIAL-2**	1	09-01-2026		TLM3	
19.	Registers	1	10-01-2026		TLM2	
20.	counters	1	20-01-2026		TLM1, TLM2	
21.	Basic structure of computer	1	20-01-2026		TLM2	
22.	Bus structure	1	23-01-2026		TLM2	
23.	Multi processors and multi computers	1	23-01-2026		TLM2	
24.	Computer generations	1	24-01-2026		TLM2	
25.	Von- Neumann Architecture	1	24-01-2026		TLM2	
26.	Assignment / Quiz	1	24-01-2026		TLM6	
No. of classes required to complete UNIT-II: 15				**No. of classes taken:**		

I-MID EXAMINATIONS **26-01-2026 TO 31-01-2025**

UNIT-III: Functional Blocks of a Computer & Data Representation

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
27.	Signed Number representation	1	03-02-2026		TLM2	
28.	Addition and Subtraction of Signed Numbers	1	06-02-2026		TLM2	
29.	Design of Fast Adders	1	07-02-2026		TLM2	
30.	Multiplication of Positive Numbers	1	10-02-2026		TLM2, TLM4	
31.	Signed-operand Multiplication	1	10-02-2026		TLM2, TLM7	
32.	**TUTORIAL-3**	1	13-02-2026		TLM3	
33.	Fast Multiplication	1	14-02-2026		TLM2	
34.	Integer Division,	1	17-02-2026		TLM2	
35.	Floating-Point Numbers and Operations	1	17-02-2026		TLM2	
36.	Processor Organization of Fundamental Concepts	1	20-02-2026		TLM2	
37.	Execution of a Complete Instruction	1	21-02-2026		TLM2	
38.	Multiple-Bus Organization	1	24-02-2026		TLM2	
39.	Hardwired Control	1	24-02-2026		TLM2	
40.	Micro programmed Control	1	27-02-2026		TLM2	
41.	Assignment / Quiz	1	28-02-2026		TLM6	
No. of classes required to complete UNIT-III: 15				**No. of classes taken:**		

UNIT-IV: CPU Control design & Parallel Processors

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Memory organization	1	01-03-2026		TLM2	
43.	Semiconductor RAM Memories	1	03-03-2026		TLM2	
44.	Concept of memory hierarchical organization	1	03-03-2026		TLM2	
45.	Read-Only Memories, Speed, Size and Cost	1	06-03-2026		TLM2	
46.	**TUTORIAL-4**	1	07-03-2026			
47.	Cache memory	1	10-03-2026		TLM2	
48.	Virtual Memories	1	10-03-2026		TLM2	
49.	Memory Management Requirements, Secondary Storage	3	13-03-2026		TLM2	
50.	Assignment / Quiz	1	14-03-2026		TLM6	
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V: Memory system design & Peripheral devices and their characteristics

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
51.	Input/Output Organization: Accessing I/O Devices	1	17-03-2026		TLM2	
52.	Interrupts	1	17-03-2026		TLM2	
53.	Processor Examples	1	20-03-2026		TLM2	
54.	Interface Circuits	1	21-03-2026		TLM2	
55.	Peripheral devices –I/O sub-systems	1	24-03-2026		TLM2	
56.	**TUTORIAL-5**	1	24-03-2026		TLM3	
57.	I/O device interface	1	27-03-2026		TLM2	
58.	I/O transfers-program controlled	1	28-03-2026		TLM2	
59.	Interrupt driven	1	31-03-2026		TLM2	
60.	DMA	1	31-03-2026		TLM2	
61.	Assignment / Quiz	1	01-03-2026		TLM6	
No. of classes required to complete UNIT-V: 11				**No. of classes taken:**		

CONTENT BEYOND THE SYLLABUS:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Pipeline Processing	2	03-04-2026		TLM2	
2.	Multicore Processors	1	04-04-2026		TLM2	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM6**	Assignment or Quiz
TLM2	PPT	**TLM7**	Seminar or GD
TLM3	Tutorial	**TLM8**	Lab Demo
TLM4	Problem Solving	**TLM9**	Case Study
TLM5	Programming	**TLM10**	Sports/NSS/NCC/ TECH FEST

PART-C

EVALUATION PROCESS (R17 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III ,IV & V)	A2=5
II- Descriptive Examination (Unit-III ,IV & V)	M2=15
II-Quiz Examination (Unit-III ,IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	**15-07-2024**		
I Phase of Instructions			7W
I Mid Examinations			**1W**
II Phase of Instructions			9W
II Mid Examinations			**1W**
Preparation and Practical's			1W
Semester End Examinations			**2W**

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO 2	Design, Implement and Evaluate a computer based system to meet desired needs.
PSO 3	Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr.B.Rajendra Prasad	Dr.B.Rajendra Prasad	Dr.B.Srinivasa Rao	Dr.S.Jayaprada
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.B.SRINIVASARAO
Course Name & Code : DATABASE MANAGEMENT SYSTEMS & 23CS03
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech/ IV/A **A.Y.:** 2024-2025

PREREQUISITE: Data Structures

COURSE EDUCATIONAL OBJECTIVES (CEOs): The Objective of this course is to know about basic concepts of DBMS, Database Languages, Database Design, Normalization Process, Transaction Processing, Indexing, and Interfacing with NOSQL using MongoDB.

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Understand the foundation of database management system and various data models. (Understand-L2)
CO2	Identify relational model concepts, implement various constraints, perform SQL queries and DML operations. (Understand-L2)
CO3	Apply SQL queries, functions, and work with nested queries, grouping, joins, views, and set operations. (Apply-L3)
CO4	Apply various normalization techniques for efficient data handling. (Apply-L3)
CO5	Understand Transaction management, recovery & indexing techniques. (Understand-L2)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	2	1	-	-	-	-	-	-	-	-	-	3	-	-
CO5	2	3	1	-	-	-	-	-	-	-	-	-	3	-	-
1 - Low			**2 –**Medium						**3 -** High						

TEXTBOOKS:

T1 Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke,
TMH (For Chapters 2, 3, 4)

T2 Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan,TMH (For Chapter 1 and Chapter 5)

REFERENCE BOOKS:

R1 Introduction to Database Systems, 8thedition, C J Date, Pearson.

R2 Database Management System, 6th edition, RamezElmasri, Shamkant B. Navathe, Pearson

R3 Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

Web Resources:

1. https://nptel.ac.in/courses/106/105/106105175/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012758066672820 22456_shared/overview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	CEOs and COs discussion, **Introduction:** An overview of Database Management System	1	02-12-2025		1 & 2	
2.	Database Systems	1	03-12-2025		1 & 2	
3.	Characteristics(Database Vs File System)	1	05-12-2025		1 & 2	
4.	Database Users, Advantages of Database systems	1	06-12-2025		1 & 2	
5.	Database applications	1	09-12-2025		1 & 2	
6.	Brief introduction of different Data Models	1	10-12-2025		1 & 2	
7.	TUTORIAL	1	12-12-2025		1 & 2	
8.	Concepts of Schema ,Instance and data independence	1	13-12-2025		1 & 2	
9.	Three tier schema architecture for data independence	1	16-12-2025		1 & 2	
10	Database system structure	1	17-12-2025		1 & 2	
11.	Environment, Centralized architecture for the database.	1	19-12-2025		1 & 2	
12.	Client Server architecture for the database.	1	20-12-2025		1 & 2	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Entity Relationship Model& Relational Model

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction, Representation of entities.	1	23-12-2025		1 & 2	
14.	Attributes, entity set, relationship, relationship se.t	1	24-12-2025		1 & 2	
15.	Constraints, sub classes, super class.	1	26-12-2025		1 & 2	
16.	Inheritance, specialization, generalization using ER Diagrams.	1	27-12-2025		1 & 2	
17.	Introduction to relational model.	1	30-12-2025		1 & 2	
18.	Concepts of domain, attribute, tuple, relation, importance of null values.	1	02-01-2026		1 & 2	
19.	TUTORIAL	1	03-01-2026		1 & 2	
20.	Constraints (Domain, Key constraints, integrity constraints) and their importance.	3	06-01-2026 07-01-2026		1 & 2	
21.	Relational Algebra.	1	20-01-2026		1 & 2	
22.	Relational Calculus.	2	21-01-2026 23-01-2026		1 & 2	
No. of classes required to complete UNIT-II: 13				**No. of classes taken:**		

UNIT-III: SQL

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
I MID EXAMINATIONS(26-01-2026 TO 31-01-2026)						
23.	BASIC SQL: Simple Database schema, data types	1	03-02-2026		1 & 2	
24.	Table definitions (create, alter), different DML operations (insert, delete, update).	1	04-02-2026		1 & 2	
25.	SQL querying (select and project) using where clause, arithmetic & logical operations	1	06-02-2026		1 & 2	
26.	SQL functions (Date and Time, Numeric, String conversion). Creating tables with relationship, implementation of key and integrity constraints	1	07-02-2026		1 & 2	
27.	Nested queries, sub queries, grouping, Aggregation, ordering	1	10-02-2026		1 & 2	
28.	TUTORIAL	1	11-02-2026		1 & 2	
29.	Implementation of different types of joins, view(updatable and non-updatable), relational set operations.	1	13-02-2026		1 & 2	
No. of classes required to complete UNIT-III: 07				**No. of classes taken:**		

UNIT-IV: Schema Refinement (Normalization)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
30.	Purpose of Normalization or schema refinement	1	18-02-2026		1 & 2	
31.	Concept of functional dependency	2	19-02-2026 21-02-2026		1 & 2	
32.	TUTORIAL	1	24-02-2026		1 & 2	
33.	Normal forms based on functional dependency	1	25-02-2026		1 & 2	
34.	Lossless join and dependency preserving decomposition	1	26-02-2026		1 & 2	
35.	1NF, 2NF and 3 NF	1	28-02-2026		1 & 2	
36.	Concept of surrogate key	1	03-03-2026		1 & 2	
37.	TUTORIAL	1	05-03-2026		1 & 2	
38.	Boyce- Codd normal form (BCNF)	1	07-03-2026		1 & 2	
39.	MVD	1	10-03-2026		1 & 2	
40.	Fourth normal form(4NF)	1	11-03-2026		1 & 2	
41.	Fifth Normal Form (5NF)	1	12-03-2026		1 & 2	
No. of classes required to complete UNIT-IV: 13				**No. of classes taken:**		

UNIT-V: Transaction Processing and Concurrency Control

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Transaction State, ACID properties.	1	17-03-2026		1 & 2	
43.	Concurrent Executions, Serializability, Recoverability.	1	18-03-2026		1 & 2	
44.	Implementation of Isolation, Testing for Serializability.	1	24-03-2026		1 & 2	
45.	Two-Phase Locking Techniques for concurrency control: Types of Locks, Time stamp-based locking.	2	25-03-2026 28-03-2026		1 & 2	
46.	Introduction to Recovery Protocols: Recovery Concepts.	1	31-03-2026		1 & 2	
47.	No-UNDO/REDO Recovery Based on Deferred Update.	1	01-04-2026		1 & 2	
48.	Recovery Techniques Based on Immediate Update	1	02-04-2026		1 & 2	
49.	Shadow Paging, ARIES ,Introduction to Indexing: Hash based Indexing.	1	04-03-2026		1 & 2	
II MID EXAMINATIONS(06-04-2026 TO 11-04-2026)						
No. of classes required to complete UNIT-V: 09				**No. of classes taken:**		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems.
PSO 2	To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues.
PSO 3	To provide a concrete foundation and enrich their abilities for employment and Higher studies in Artificial Intelligence and Data Science with ethical values.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr.B.SRINIVASARAO**	**Dr.M.Srinivasa Rao**		**Dr. S.Jayaprada**
Signature				

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(AUTONOMOUS)
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Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PART-A

Name of Course Instructor: Imran Abdul
Course Name & Code : Optimization Techniques-20ME09
L-T-P Structure : 2-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech., IV-Sem., CSE(AIML) – A section
A.Y: 202-26

PREREQUISITE: Differential Equations, Linear algebra and Transformation Techniques

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The course aims to equip students with the ability to define objective and constraint functions in terms of design variables for optimization problems, including both single and multi- variable problems with and without constraints. It covers the application of linear programming techniques, including the use of slack and surplus variables in the Simplex method, and the formulation of transportation and assignment problems as linear programming problems. Additionally, the course presents nonlinear programming techniques for both unconstrained and constrained problems, including the use of penalty functions.

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	State and formulate optimization problems, with and without constraints, using design variables from an engineering design problem. (Remember-L1)
CO2	Apply classical optimization techniques to minimize or maximize a multi-variable objective function, with or without constraints, and arrive at an optimal solution. (Understand-L2)
CO3	Apply and solve transportation and assignment problems using the Linear Programming Simplex method. (Apply-L3)
CO4	Apply gradient and non-gradient methods to nonlinear optimization problems, using interior or exterior penalty functions for constraints, to derive optimal solutions. (Apply-L3)
CO5	Formulate and apply Dynamic Programming techniques to problems such as inventory control, production planning, and engineering design, to reach a final optimal solution from the current optimal solution. (Analyse-L4)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1									1			
CO2	3	2	2									1			
CO3	3	2										1			
CO4	3	2										1			
CO5	3	2										1			
1 - Low			**2** –Medium								**3** - High				

TEXTBOOKS:

1. Engineering optimization: Theory and practice", S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research", H.S. Kasene & K.D. Kumar, Springer (India), Pvt.LTd.

REFERENCE BOOKS:

1. "Optimization Methods in Operations Research and systems Analysis", by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research, Dr.S.D.Sharma, Kedarnath, Ramnath & Co.

Web Resources: https://nptel.ac.in/courses/111105039

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - A

UNIT-I: INTRODUCTION TO CLASSICAL OPTIMIZATION TECHNIQUES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Introduction, Overview of Optimization Problem	1	01-12-2025		TLM2	
2	Concepts and terms related to optimization	1	04-12-2025		TLM1	
3	Classification of optimization problems		06-12-2025			
4	Necessary and sufficient conditions for single variable optimization without constraints.	1	08-12-2025		TLM1	
5	Necessary and sufficient conditions for a multivariable optimization problem without constraints	1	11-12-2025		TLM1	
6	Numerical Examples	1	13-12-2025		TLM1	
7	Multivariable optimization with equality constraints.	1	15-12-2025		TLM1	
8	Solution by the method of Lagrange Multipliers	1	18-12-2025		TLM1	
9	Numerical examples.	1	20-12-2025		TLM2	
10	Numerical examples.	1	22-12-2025		TLM2	
No. of classes required to complete UNIT-I		10				

UNIT-II: LINEAR PROGRAMMING (LP)

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
11	Introduction to linear programming problem& Standard form of linear programming problem.	1	27-12-2025		TLM1	
12	Geometry of linear programming problem.	1	29-12-2025		TLM1	
13	Definitions and theorems	1	03-01-2026		TLM1	
14	Solution of systematic linear simultaneous equations	1	05-01-2026		TLM1	
15	Pivotal reduction of systematic general equations	1	08-01-2026		TLM1	
16	Motivation to the simplex method	1	10-01-2026		TLM1	
17	Simplex algorithm	1	12-01-2026		TLM1	
18	Numerical Examples.	1	17-01-2026		TLM1	
19.	Numerical Examples.	1	19-01-2026		TLM2	
No. of classes required to complete UNIT-II		09				

UNIT-III : Transportation Problem.

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
20	Introduction to Transportation problem.	1	22-01-2026		TLM2	
21	Finding feasible solution by north -west corner rule.	1	24-01-2026		TLM1	
22	Finding feasible solution by least cost method or matrix minima method.	1	01-02-2026		TLM1	
23	Finding feasible solution by Vogel's approximation method	1	04-02-2026			
24	Numerical examples	1	06-02-2026		TLM1	
25	Testing for optimality of balanced transportation problem	1	08-02-2026		TLM1	
26	Special cases of	1	11-02-2026		TLM1	

	transportation problems					
27	Numerical examples	1	13-02-2026		TLM1	
No. of classes required to complete UNIT-III		08				

UNIT-IV : NON-LINEAR PROGRAMMING

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28	Unconstrained non-linear programming problem-one dimensional methods, classification	1	15-02-2026		TLM2	
29	Fibonacci method	1	18-02-2026		TLM1	
30	Univariate method	1	20-02-2026		TLM1	
31	Steepest descent method	1	22-02-2026			
31	Characteristics of constrained optimization, classification	1	25-02-2026		TLM1	
32	Basic approach of penalty function method	1	27-02-2026		TLM1	
33	Interior , exterior penalty function methods	1	01-03-2026		TLM1	
34	Multivariable optimization with inequality constraints	1	04-03-2026		TLM1	
35	KKT conditions, example	1	06-03-2026		TLM1	
36	Numerical examples	1	08-03-2026			
No. of classes required to complete UNIT-IV		10				

UNIT-V: DYNAMIC PROGRAMMING

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
38	Dynamic programming multistage decision process, types	1	11-03-2026		TLM2	
39	Types of dynamic programming problem.	1	13-03-2026			
39	Concepts of suboptimization problem,	1	15-03-2026		TLM1	
40	principle of optimality	1	18-03-2026		TLM1	
40	Computational procedure in dynamic programming	1	22-03-2026		TLM1	

	problem					
41	Calculus method of solution	1	25-03-02026		TLM1	
42	Tabular method of solution,	1	29-03-2026		TLM1	
43	Numerical examples	1	29-03-2026		TLM1	
No. of classes required to complete UNIT-V		08				

CONTENT BEYOND SYLLABUS:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods
1	Introduction to meta-heuristic optimization	1	01-04-2026		TLM2

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system

	components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the ring and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Imran Abdul	Dr.M.S.Grdhar	Dr.M.S.Giridhar	Dr.J.S.Vara Prasad
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. K. Ravi Kumar
Course Name & Code : MACHINE LEARNING & 23AM01
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B. Tech/IV/A **A.Y.:** 2025-26
PREREQUISITES : **Probability and Statistics, Data Warehousing and Data Mining**

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objectives of the course are to

- Define machine learning and its different types (supervised and unsupervised) and understand their applications.
- Apply supervised learning algorithms including decision trees and k-nearest neighbours (k-NN).
- Implement unsupervised learning techniques, such as K-means clustering

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Understand development steps of model building and evaluation approaches. **(Understand-L2**
CO2	Apply Nearest Neighbor-based models to solve real-time regression and classification problems **(Apply-L3)**
CO3	Make use of supervised learning algorithms to solve classification problems **(Apply-L3)**
CO4	Apply linear discriminants and perceptron classifiers to classify datasets **(Apply-L3)**
CO5	Apply various clustering techniques to solve complex problems **(Apply-L3)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	-	-	-	-	-	-	-	1	1	-	3
CO2	3	2	-	2	2	-	-	-	-	-	-	2	2	-	-
CO3	2	3	2	2	2	-	-	-	-	-	-	2	-	2	2
CO4	2	2	-	2	2	-	-	-	-	-	-	2	2	2	-
CO5	2	2	2	2	2	-	-	-	-	-	-	2	2	2	-
1 - Low **2 –**Medium **3 -** High															

TEXTBOOKS:

T1 "Machine Learning Theory and Practice", M N Murthy, V S Ananthanarayana, Universities Press (India), 2024.

REFERENCE BOOKS:

R1 "Machine Learning", TomM. Mitchell, McGraw-Hill Publication, 2017
R2 "Machine Learning in Action", Peter Harrington, Dream Tech.
R3 "Introduction to Data Mining", Pang-Ning Tan, Michel Stenbach, Vipin Kumar, 7th Edition, 2019.

Web Resources:

https://nptel.ac.in/courses/106106139

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Machine Learning

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and COs	1	1-12-2025		TLM1,2	
2.	Evolution of Machine Learning	1	2-12-2025			
3.	Paradigms for ML	1	3-12-2025		TLM1,2	
4.	Learning by Rote, Learning by Induction	1	5-12-2025		TLM1,2	
5.	Reinforcement Learning, Types of Data	2	8-12-2025 & 9-12-2025		TLM1,2	
6.	Matching, Stages in Machine Learning,	2	10-12-2025 & 12-12-2025		TLM1,2	
7.	Data Acquisition, Feature Engineering,	1	15-12-2025		TLM1,2	
8.	Data Representation, Model Selection	1	16-12-2025		TLM1,2	
9.	Model Learning, Model Evaluation	2	17-12-2025 & 19-12-2025		TLM1,2	
10.	Model Prediction, Search and Learning, Data Sets.	2	22-12-2025 & 23-12-2025		TLM1,2	
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT-II: Nearest Neighbor-Based Models

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Proximity Measures	1	24-12-2025		TLM1,2	
2.	Distance Measures, Non-Metric Similarity Functions,	2	26-12-2025 & 29-12-2025		TLM1,2	
3.	Proximity Between Binary Patterns	1	30-12-2025		TLM1,2	
4.	Different Classification Algorithms Based on the Distance Measures	2	31-12-2025 & 02-01-2026		TLM1,2	
5.	K-Nearest Neighbor Classifier	2	05-01-2026 & 06-01-2026		TLM1,2	
6.	Radius Distance Nearest Neighbor Algorithm	1	07-01-2026		TLM1,2	
7.	KNN Regression, Performance of Classifiers	2	09-01-2026 & 19-01-2026		TLM1,2	
8.	Performance of Regression Algorithms	1	20-01-2026		TLM1,2	
	Unit-1 and 2 Revision	2	21-01-2026 & 23-01-2026		TLM1,2	
No. of classes required to complete UNIT-II: 13				**No. of classes taken:**		
MID-1 **26.01.2026 to 31-01-2026**						

UNIT-III: Models Based on Decision Trees

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Decision Trees for Classification	1	02-02-2026		TLM1,2	
2.	Impurity Measures ,Properties	1	03-02-2026		TLM1,2	
3.	Regression Based on Decision Trees	1	04-02-2026		TLM1,2	
4.	Bias–Variance Trade-off,	1	06-02-2026		TLM1,2	
5.	Random Forests for Classification and Regression	2	09-02-2026 & 10-02-2026		TLM1,2	
6.	The Bayes Classifier: Introduction to the Bayes Classifier	2	11-02-2026 & 13-02-2026		TLM1,2	
7.	Bayes' Rule and Inference,	2	16-02-2026 & 17-02-2026		TLM1,2	
8.	The Bayes Classifier and its Optimality	2	18-02-2026 & 20-02-2026		TLM1,2	
9.	Multi-Class Classification | Class Conditional Independence and Naive Bayes Classifier (NBC)	2	23-02-2026 & 24-02-2026		TLM1,2	
No. of classes required to complete UNIT-III: 14				**No. of classes taken:**		

UNIT-IV: Linear Discriminants for Machine Learning

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Linear Discriminants	1	25-02-2026		TLM1,2	
2.	Linear Discriminants for Classification	1	27-02-2026		TLM1,2	
3.	Perceptron Classifier, Perceptron Learning Algorithm	2	02-03-2026 & 03-03-2026		TLM1,2	
4.	Support Vector Machines, Linearly Non-Separable Case	2	04-03-2026 & 06-03-2026		TLM1,2	
5.	Non-linear SVM, Kernel Trick	2	09-03-2026 & 10-03-2026		TLM1,2	
6.	Logistic Regression, Linear Regression	2	11-03-2026 & 13-03-2026		TLM1,2	
7.	Multi-Layer Perceptrons (MLPs)	2	16-03-2026 & 17-03-2026		TLM1,2	
8.	Backpropagation for Training an MLP.	1	18-03-2026		TLM1,2	
No. of classes required to complete UNIT-IV: 13				**No. of classes taken:**		

UNIT-V: Clustering

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Clustering	1	20-03-2026		TLM1,2	03.03.2024
2.	Partitioning of Data, Matrix Factorization	1	23-03-2026		TLM1,2	
3.	Clustering of Patterns, Divisive Clustering,	1	24-03-2026		TLM1,2	
4.	Agglomerative Clustering, Partitional Clustering,	1	25-03-2026		TLM1,2	
5.	K-Means Clustering	1	27-03-2026		TLM1,2	
6.	Soft Partitioning, Soft Clustering	1	30-03-2026		TLM1,2	
7.	Fuzzy C-Means Clustering, Rough Clustering,	1	31-03-2026		TLM1,2	
8.	Rough K-Means Clustering Algorithm,	1	01-04-2026		TLM1,2	
9.	Expectation Maximization-Based Clustering, Spectral Clustering	1	03-04-2026		TLM1,2	
No. of classes required to complete UNIT-V: 9				**No. of classes taken:**		

CONTENT BEYOND THE SYLLABUS:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Combining Inductive and Analytical Learning	1	01-04-2026		TLM1,2	
2.	Case Study of Analytics Learning	1	03-04-2026		TLM1,2	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT(NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (Unit-III, IV & V)	M2=15
II-Quiz Examination (Unit-III, IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	The ability to apply Software Engineering practices and strategies in software project development using open-source programming environment for the success of Organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr.K.RaviKumar**	**Dr.Sk. Jameer**	**Dr.Sk. Jameer**	**Dr. S Jayaprada**
Signature				

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FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM : II B. Tech., II-Sem., AIML-A
ACADEMIC YEAR : 2025-26
COURSE NAME & CODE : PROBABILITY & STATISTICS
L-T-P STRUCTURE : 3-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : **Dr. K. Bhanu Lakshmi**
COURSE COORDINATOR : Dr. D. Vijay Kumar
PRE-REQUISITES : Basics of mathematics

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To familiarize the students with the foundations of probability and statistical methods
- To impart probability concepts and statistical methods in various applications Engineering

COURSE OUTCOMES (COs): Upon successful completion of this course, the student should be able to

CO1**:** Classify the concepts of data science and its importance (L2)
CO2: Interpret the association of characteristics and through correlation and regression tools (L3)
CO3: Apply discrete and continuous probability distributions (L3)
CO4: Design the components of a classical hypothesis test (L4)
CO5: Infer the statistical inferential methods based on small and large sampling tests (L4)

COURSE ARTICULATION MATRIX (Correlation between Cos &POs, PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	-	-	-	-	-	-	2
CO2	3	3	2	3	-	-	-	-	-	-	-	2
CO3	3	3	2	3	-	-	-	-	-	-	-	2
CO4	3	2	2	3	-	-	-	-	-	-	-	2
CO5	3	3	2	3	-	-	-	-	-	-	-	2

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

BOS APPROVED TEXT BOOKS:

1. **Miller and Freund's,** Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S. **C. Gupta and V.K. Kapoor,** Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

BOS APPROVED REFERENCE ROOKS:

1. **Shron L. Myers, Keying Ye, Ronald E Walpole,** Probability and Statistics for Engineers and the Scientists, 8th Edition. Pearson 2007.
2. **Jay 1. Devore,** Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. **Sheldon M. Ross,** Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.
4. **Johannes Ledolter and Robert V. Hogg,** Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Descriptive statistics and methods for data science

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction class	1	01/12/2025		TLM1	CO1	T1,T2	
2.	Syllabus Co's, PO's	1	02/12/2025		TLM1	CO1	T1,T2	
3.	Unit-1, Introduction to data science	1	03/12/2025		TLM1	CO1	T1,T2	
4.	Statistics- Population and sample, Collection of data,	1	04/12/2025		TLM1	CO1	T1,T2	
5.	Types of variables	1	08/12/2025		TLM1	CO1	T1,T2	
6.	Data visualization	1	09/12/2025		TLM1	CO1	T1,T2	
7.	Measures of central tendency, A.M	1	10/12/2025		TLM1	CO1	T1,T2	
8.	Median, mode problems	1	11/12/2025		TLM1	CO1	T1,T2	
9.	Measures of variability Range, Mean deviation	1	15/12/2025		TLM1	CO1	T1,T2	
10.	S.D. & Q D	1	16/12/2025		TLM1	CO1	T1,T2	
11.	Skewness	1	17/12/2025		TLM1	CO1	T1,T2	
12.	Kurtosis	1	18/12/2025		TLM1	CO1	T1,T2	
13.	TUTORIAL I	1	22/12/2025		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-I		13			No. of classes taken:			

UNIT-II: Correlation and Regression

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
14.	Types of Correlation	1	23/12/2025		TLM1	CO2	T1,T2	
15.	Coefficient of correlation	1	24/12/2025		TLM1	CO2	T1,T2	
16.	Rnak correlation	1	29/12/2025		TLM1	CO2	T1,T2	
17.	Linear regression (lines)	1	30/12/2025		TLM1	CO2	T1,T2	
18.	Problems	1	31/12/2025		TLM1	CO2	T1,T2	
19.	Multiple regression	1	05/01/2026		TLM1	CO2	T1,T2	
20.	Regression coefficients	1	06/01/2026		TLM1	CO2	T1,T2	
21.	Properties, problems	1	07/01/2026		TLM1	CO2	T1,T2	
22.	Fitting of parabola	1	08/01/2026		TLM1	CO2	T1,T2	
23.	Exponential curve	1	19/01/2026		TLM1	CO2	T1,T2	
24.	Fitting of power curve	1	20/01/2026		TLM1	CO2	T1,T2	
25.	TUTORIAL II	1	21/01/2026		TLM3	CO2	T1,T2	
No. of classes required to complete UNIT-II		12			No. of classes taken:			

I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)

UNIT-III: Probability and Distributions

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
26.	Probability, Introduction	1	22/01/2026		TLM1	CO3	T1,T2	
27.	Conditional probability	1	02/02/2026		TLM1	CO3	T1,T2	
28.	Bayes theorem	1	03/02/2026		TLM1	CO3	T1,T2	
29.	Problems	1	04/02/2026		TLM1	CO3	T1,T2	
30.	Random variables, Distribution function	1	05/02/2026		TLM1	CO3	T1,T2	
31.	Probability mass function	1	09/02/2026		TLM1	CO3	T1,T2	
32.	Probability density function	1	10/02/2026		TLM1	CO3	T1,T2	
33.	Mathematical expectation, variance	1	11/02/2026		TLM1	CO3	T1,T2	
34.	Binomial distribution	1	12/02/2026		TLM1	CO3	T1,T2	
35.	Poisson distribution	1	16/02/2026		TLM1	CO3	T1,T2	
36.	problems	1	17/02/2026		TLM1	CO3	T1,T2	
37.	Normal distribution	1	18/02/2026		TLM1	CO3	T1,T2	
38.	TUTORIAL III	1	19/02/2026		TLM3	CO3	T1,T2	
39.	Uniform distribution	1	23/02/2026		TLM1	CO3	T1,T2	
No. of classes required to complete UNIT-III		14			No. of classes taken:			

UNIT-IV: Sampling Theory

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
38.	Introduction: population & sample Sampling distribution	1	24/02/2026		TLM1	CO4	T1,T2	
39.	Sampling distribution of means & variance	1	25/02/2026		TLM1	CO4	T1,T2	
40.	problems	1	26/02/2026		TLM1	CO4	T1,T2	
41.	Central limit theorem	1	02/03/2026		TLM1	CO4	T1,T2	
42.	Estimation- point & interval, maximum error	1	03/03/2026		TLM1	CO4	T1,T2	
43.	Estimation using t-distribution	1	05/03/2026		TLM1	CO4	T1,T2	
44.	Estimation using F-distribution	1	09/03/2026		TLM1	CO4	T1,T2	
45.	Estimation using χ^2 −distribution	1	10/03/2026		TLM1	CO4	T1,T2	
46.	TUTORIAL IV	1	11/03/2026		TLM3	CO4	T1,T2	
No. of classes required to complete UNIT-IV		9			No. of classes taken:			

UNIT-V: Tests of Hypothesis

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
47.	Hypothesis: introduction, Definitions	1	12/03/2026		TLM1	CO5	T1,T2	
48.	Z-test for single mean	1	16/03/2026		TLM1	CO5	T1,T2	
49.	Z-test for diff. of mean	1	17/03/2026		TLM1	CO5	T1,T2	
50.	Z-test for single proportion	1	18/03/2026		TLM1	CO5	T1,T2	
51.	Z-test for difference of proportion	1	23/03/2026		TLM1	CO5	T1,T2	
52.	t-test for single mean	1	24/03/2026		TLM1	CO5	T1,T2	
53.	t-test for diff. means,	1	25/03/2026		TLM1	CO5	T1,T2	
54.	F-test for variances	1	30/03/2026		TLM1	CO5	T1,T2	
55.	χ^2 −test for goodness of fit	1	31/03/2026		TLM1	CO5	T1,T2	
56.	χ^2 −test for independence	1	01/04/2026		TLM1	CO5	T1,T2	
No. of classes required to complete UNIT-V		10			No. of classes taken:			

Content beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
57.	Paired t-test	1	02/04/2026		TLM1	CO5	T1,T2	
No. of classes		1			No. of classes taken:			
II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)								

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/SwayamPrabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE):	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Dr.K.Bhanu Lakshmi	**Dr. D. Vijay Kumar**	**Dr. A. RAMI REDDY**	**Dr. T. SATYANARAYANA**
Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, (AUTONOMOUS)
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ISO 21001 : 2018, 50001 : 2018, 14001: 2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. R. Padma Venkat
Course Name & Code : Personality Development & Corporate Communication Skills
L-T-P Structure : **0**-1-0 **Credits:** Mandatory Course
Program/Sem/Sec : B. Tech- IV SEM / CSM-A
Academic Year : 2025-26

COURSE OBJECTIVES: By the end of the course, students will be able to:

1. Develop communication and interpersonal skills required for workplace interactions.
2. Enhance speaking proficiency through interviews, role plays, JAM, and group discussions.
3. Improve reading and listening comprehension skills for academic and competitive contexts.
4. Strengthen corporate writing skills such as emails, opinions, and structured responses.
5. Master essential grammar skills aligned with campus recruitment assessments.

COURSE OUTCOMES (COs): After completion of the course, the student will be able to

CO1	Demonstrate improved interpersonal skills, time management, stress management, and professional etiquette.
CO2	Participate confidently in interviews, extempore, JAM, storytelling, and group discussions.
CO3	Apply effective reading and listening strategies to answer comprehension-based MCQs.
CO4	Produce clear and accurate corporate-style emails, essays, and opinion paragraphs.
CO5	Apply grammar rules accurately in sentences, MCQs, and corporate communication tasks.

COURSE ARTICULATION MATRIX

Course Outcomes	**Programme Outcomes**											
POs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1.	1	1			2	2		2	3	3		
CO2.		1			2				3	3		
CO3.	2	2		2	2				1	2		
CO4.	2	2	1	2	2				2	3		1
CO5.	3	2		2	3				1	2		1

1 = Slight (Low) 2= Moderate (Medium) 3 = Substantial (High)

(Correlation between COs & POs)

Syllabus - English Certification Course-2 (IV Semester) R23

Module-1: Communication & Interpersonal Skills

- Personality development skills - Time Management skills – Stress Management skills (with focus on facing interviews)
- Self-introduction
- Telephone & email etiquette - Successful workplace communication styles

Module-2: Speaking Mastery

- Role plays (Mock Interview Style)
- Extempore + JAM (advanced prompts)
- Story creation from prompts
- Group Discussion: Introduction, justification, closing statements

Module-3: Reading & Listening

- Reading comprehension (TOEFL) & Listening Comprehension passages with MCQs
- Case-study style reading comprehension followed by MCQs
- Essay Writing (150–200 words)

Module-4: Writing for Corporate Contexts

- Opinion writing (argument + conclusion)
- Sentence correction and Sequencing (MCQs)
- Email Writing-Corporate style- Giving responses

Module-5: Grammar- MCQs (aligned with MNCs' Communication Assessment syllabus)

- Articles & Prepositions
- Tenses (Present, Past, Future forms)
- Active and Passive Voice (Identification & correction)
- Basic Error Identification
- Subject-Verb Agreement
- Common Errors in Usage
- Conditional Sentences
- Reported Speech
- Sentence Sequencing (paragraph level)
- Idiomatic Usage
- Error Identification (Advanced patterns)

COURSE DELIVERY PLAN (LESSON PLAN)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching learning method	HOD Sign
1.	**Module-1: Communication & Interpersonal Skills:**Personality development skills - Time Management skills – Stress Management skills (with focus on facing interviews)	1	4-12-25		TLM1 TLM4	
2.	Self-introduction	1	11-12-25		TLM1 TLM5	
3.	Telephone & email etiquette - Successful workplace communication styles	1	18-12-25		TLM1 TLM4 TLM3	
4.	**Module-2: Speaking Mastery** Role plays (Mock Interview Style)	1	8-1-26		TLM2 TLM4	
5.	Extempore + JAM (advanced prompts)	1	22-1-26		TLM2 TLM4	
6.	Story creation from prompts(Writing)	1	29-1-26		TLM2 TLM4	
7.	Group Discussion: Introduction, justification, closing statements.	1	5-2-26		TLM1 TLM3	
8.	**Module-3: Reading & Listening.** Reading comprehension (TOEFL) Listening Comprehension passages with MCQs	1	12-2-26		TLM1 TLM3	
9.	Case-study style reading comprehension followed by MCQs	1	19-2-26		TLM2 TLM5	
10.	Essay Writing (150–200 words)	1	26-2-26		TLM4, TLM6	
11.	**Module-4: Writing for Corporate Contexts** Opinion writing (argument + conclusion)	1	5-3-26		TLM4, TLM6	
12.	Sentence correction and Sequencing (MCQs)		5-3-26		TLM1, TLM5	
13.	Email Writing-Corporate style- Giving responses	1	12-3-26		TLM1, TLM6	
14.	**Module-5: Grammar**- MCQs (aligned with MNCs' Communication Assessment syllabus) Articles & Prepositions Tenses (Present, Past, Future forms) Active and Passive Voice (Identification & correction)	1	19-3-36		TLM1 TLM3 TLM5	
15.	Basic Error Identification Subject-Verb Agreement Common Errors in Usage Conditional Sentences Reported Speech	1	26-3-26		TLM1 TLM3 TLM5	
16.	Sentence Sequencing (paragraph level) Idiomatic Usage Error Identification (Advanced patterns)	1	2- 4 -26		TLM1 TLM3 TLM5	
17.	Assessment	1	4 - 4 -26		Google Form Link	
No. of classes required to complete Syllabus:		**15 + 1(Assessment)**				

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS/AI Tools)
TLM3	Tutorial	**TLM6**	Group Discussion/Interview skills

Evaluation Task	Marks
English Certification Course-II Assessment	100

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr. R. Padma Venkat**	**Dr. R.Padma Venkat**	**Dr. R.Padma Venkat**	**Dr. T. Satyanarayana**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. K.Ravi Kumar
Course Name & Code **:** MACHINE LEARNING LAB & 23AM51
L-T-P Structure **: 3-0-0** **Credits:** 1.5
Program/Sem/Sec : B. Tech/IV/A **A.Y.:** 2025-26

PREREQUISITE: Probability and Statistics, Programming Knowledge

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objectives of this lab are

- To learn about computing central tendency measures and Data preprocessing techniques
- To learn about classification and regression algorithms
- To apply different clustering algorithms for a problem

Course Outcomes: This Course will enable students to

CO1	Apply the appropriate pre-processing techniques on data set. **(Apply – L3)**
CO2	Implement supervised Machine Learning algorithms**. (Apply – L3)**
CO3	Implement advanced Machine Learning algorithms. **(Apply – L3)**
CO4	Improve individual / teamwork skills, communication & report writing skills with ethical values.

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO2	PSO3
CO1	1	2	1	-	-	-	-	-	-	-	-	1	1	-	3
CO2	1	2	-	2	2	-	-	-	-	-	-	2	2	-	-
CO3	2	3	2	2	2	-	-	-	-	-	-	2	-	2	2
CO4	-	-	-	-	-	-	-	2	2	2	-	2	2	2	-
1 - Low **2 –**Medium **3 -** High															

Note: Enter Correlation Levels 1 or 2 or 3. If there is no correlation, put '-' 1- Slight (Low), 2 – Moderate (Medium), 3 - Substantial (High)

TEXTBOOKS:

T1 "Machine Learning Theory and Practice", M N Murthy, V S Ananthanarayana, Universities Press (India), 2024.

REFERENCE BOOKS:

R1 "Machine Learning", TomM. Mitchell, McGraw-Hill Publication, 2017
R2 "Machine Learning in Action", Peter Harrington, Dream Tech.
R3 "Introduction to Data Mining", Pang-Ning Tan, Michel Stenbach, Vipin Kumar, 7th Edition, 2019.

Web Resources:

1. https://nptel.ac.in/courses/106106139
2. https://www.analyticsvidhya.com/blog/2021/07/basic-statistics-concepts-for-machine-learning
3. https://notepub.io/notes/programming-languages/python-for-data-science/python-for-data-science
4. https://www.analyticsvidhya.com/blog/2021/10/handling-missing-value/

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Overview of the syllabus,program on prerequisites	3	5-12-2025		TLM4	
2	Compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation.	3	12-12-2025		TLM4	
3	Apply the following Pre-processing techniques for a given dataset. a. Attribute selection b. Handling Missing Values c. Discretization d. Elimination of Outliers	6	19-12-2025 & 26-12-2025		TLM4	
4	Apply KNN algorithm for classification and regression	3	02-01-2026		TLM4	
5	Demonstrate decision tree algorithm for a classification problem and perform parameter tuning for better results	3	09-01-2026		TLM4	
6	• Demonstrate decision tree algorithm for a regression problem • Apply Random Forest algorithm for classification and regression	3	16-01-2026		TLM4	
7	• Demonstrate Naïve Bayes	6	23-01-2026 & 06-02-2026		TLM4	

	Classification algorithm. • Apply Support Vector algorithm for classification					
8	• Demonstrate simple linear regression algorithm for a regression problem • Apply Logistic regression algorithm for a classification problem	6	13-02-2026 & 20-02-2026		TLM4	
9	Demonstrate Multi-layer Perceptron algorithm for a classification problem	3	27-02-2026		TLM4	
10	Implement the K-means algorithm and apply it to the data you selected. Evaluate performance by measuring the sum of the Euclidean distance of each example from its class center. Test the performance of the algorithm as a function of the parameters K.	6	06-03-2026 & 13-03-2026		TLM4	
11	Demonstrate the use of Fuzzy C-Means Clustering	3	20-03-2026		TLM4	
12	Demonstrate the use of Expectation Maximization based clustering algorithm	3	27-03-2026		TLM4	
13	Internal Examination	3	03-04-2026		TLM4	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Day to Day Work:	15
Internal Test	15
Continuous Internal Assessment	30
Procedure	20
Execution & Results	30
Viva-voce	20
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive

	clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	The ability to apply Software Engineering practices and strategies in software project development using open source programming environment for the success of organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr.K.Ravi Kumar**	**Dr.Sk Jameer**	**Dr.Sk Jameer**	**Dr. S Jayaprada**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

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hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT
PART-A

Name of Course Instructor: Dr.B.SRINIVASARAO
Course Name & Code **:** Database Management Systems Lab (23CS56)
L-T-P Structure **:** 0-0-3 **Credits:** 1.5
Program/Sem/Sec : B.Tech /IV/A **A.Y:** 2025-2026

PRE-REQUISITE : Programming language, Discrete Mathematical Structures, and Data Structures.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this lab is to provide a strong formal foundation in database concepts, technology, and practice to the participants to groom them into well-informed database application developers.

COURSE OUTCOMES (COs): At the end of the course, students are able to

CO 1	Implement SQL queries using DDL/DML commands.(Apply-L3)
CO 2	Apply different Integrity constraints & Normalization techniques for effective database design. .(Apply-L3)
CO 3	Implement PL/SQL including procedures, functions, cursors and triggers. .(Apply-L3)
CO 4	Improve individual / teamwork skills, communication & report writing skills with ethical values.

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	2	-	2	-	-	-	-	-	-	-	3	-
CO2	-	1	1	1	1	-	-	-	-	-	-	-	3	-
CO3	3	-	1	1	1	-	-	-	-	-	-	-	3	-
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Introduction to SQL, syntax	3	08-12-2025		TLM4	
2	Experiment - 1	3	15-12-2025		TLM4	
3	Experiment - 2	3	22-12-2025		TLM4	
4	Experiment - 3	3	29-12-2025		TLM4	
5	Experiment - 4	3	05-01-2026		TLM4	
6	Experiment – 5,6,7,8	6	19-01-2026 & 02-02-2026		TLM4	
7	Experiment – 9,10,11	6	09-02-2026 & 16-02-2026		TLM4	
8	Experiment – 12,13	6	23-02-2026 & 02-03-2026		TLM4	
9	Experiment – 14	3	09-03-2026		TLM4	
10	Experiment – 15	3	16-03-2026		TLM4	
11	Design database for Case study	3	23-03-2026		TLM4	
12	Internal Exam	3	30-03-2026		TLM4	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulations):

According to Academic Regulations of R23 Distribution and Weightage of Marks For Laboratory Courses is as follows

(a) Continuous Internal Evaluation (CIE): The Continuous Internal Evaluation (CIE) is based on the following parameters:

Parameter	**Marks**
Day to Day work	10
Record	05
Internal Test	15
Total	30

(b) Semester End Examinations (SEE: The Semester End examinations (SEE) for laboratory courses shall be jointly conducted by internal and external examiners with 3 hours duration and evaluated for 70 marks.

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems.
PSO 2	To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues.
PSO 3	To provide a concrete foundation and enrich their abilities for employment and Higher studies in Artificial Intelligence and Data Science with ethical values.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr.B.SRINIVASARAO**	**Dr.M.Srinivasa Rao**		**Dr.S.Jayaprada**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING(AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. Y.KRANTHI KUMAR

Course Name & Code **:** FULL SATCK DEVELOPMENT-I & 23CSS2

L-T-P Structure **: 0-1-2** **Credits:** 2

Program/Sem/Sec : B.Tech/CSE(AI&ML)/IV/A **A.Y.:** 2025-26

Pre-requisite: Knowledge of basic Computer hardware & software.

COURSE EDUCATIONAL OBJECTIVE:

The main objectives of the course are to

- Make use of HTML elements and their attributes for designing static web pages
- Build a web page by applying appropriate CSS styles to HTML elements
- Experiment with JavaScript to develop dynamic web pages and validate forms

Course Outcomes: After successful completion of the course the students are able to

CO1: Design static web pages by using HTML elements. (Apply-L3)

CO2: Develop a web page by applying appropriate CSS styles to HTML elements. (Apply-L3)

CO3: Develop dynamic web pages and validate forms using JavaScript. (Apply-L3)

CO4: Improve individual / teamwork skills, communication & report writing skills with ethical values

COURSE ARTICULATION MATRIX (Correlation between Cos, Pos & PSOs):

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	3								3		
CO2	3	2	2	1	3								3		
CO3	3	2	2	1	3								3		
CO4								2	2	2	2	2	2		

Note: 1- Slight (Low), **2 -** Moderate (Medium), **3 -** Substantial (High)

PART-B:

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	Introduction to Web and its applications & basic tags in HTML programming	3	04-12-2025		
2.	Lists, Links and Images	3	11-12-2025		
3.	HTML Tables, Forms and Frames	3	18-12-2025		
4.	HTML Tables, Forms and Frames	3	08-01-2026		
5.	HTML 5 and Cascading Style Sheets, Types of CSS	3	22-01-2026		
6.	Selector forms	3	05-02-2026		
7.	CSS with Color, Background, Font, Text and CSS Box Model	3	12-02-2026		
8.	Introduction to Java script and how to embedded JS in html	3	19-02-2026		
9.	Applying JavaScript - internal and external, I/O, Type Conversion	3	26-02-2026		
10.	JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects	3	05-03-2026		
11.	JavaScript Functions and Events	3	12-03-2026		
12.	Internal Exam	3	02-04-2026		

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Day to Day Work:	15
Internal Test	15
Continuous Internal Assessment	30
Procedure	20
Execution & Results	30
Viva-voce	20
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
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PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques.
PSO 2	Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies.
PSO 3	To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr.Y.Kranthi Kumar	Dr.S.Nagarjuna Reddy	Dr.Sk.Jameer	Dr.S.Jayaprada
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING(AI&ML)

Name of Course Instructor : **D.MANGAMMA**
Course Name & Code : Design Thinking & Innovation (23ME57)
Regulation : R23
L-T-P Structure : 1-0-2 **Credits:** 02

Program/Sem/Sec : B.Tech – IV Semester – A Section **A.Y.:** 2024-25

PREREQUISITE: None

COURSE OBJECTIVES:

The objectives of the course are to

- Bring awareness on innovative design and new product development.
- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Apply fundamental design components, principles, and new materials to create and improve design projects. **(Applying-L3)**
CO2	Apply the design thinking process to develop and present innovative product solutions. **(Applying-L3)**
CO3	Analyze the relationship between creativity and innovation, evaluate their roles in organizations, and develop strategic plans for transforming creative ideas into innovative solutions**. (Analyzing-L4)**
CO4	Analyze to work in a multidisciplinary environment. **(Analyzing-L4)**
CO5	Apply design thinking principles to address business challenges, develop and test business models and prototypes, and evaluate the value of creativity. **(Evaluating-L5)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1			3							2		3	
CO2	1	2	2		3							2		3	
CO3	3	3		2	3							3			3
CO4	1	1			3							2			3
1 - Low						**2** –Medium							**3** - High		

Textbooks:

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003

Online Learning Resources:

- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	UNIT–I: INTRODUCTION TO DESIGN THINKING					
1	Introduction to elements and principles of Design	1	13-12-2025		TLM2	
	Activity: To understand the importance of design	2	13.12.2025		TLM6	
2	History of Design Thinking, New materials in Industry	1	20.12.2025		TLM2	
	Activity: To understand the importance of teamwork	2	20.12.2025		TLM6	
3	Basics of design-dot, line, shape, form as fundamental design components	1	27.12.2025		TLM2	
	Activity: Developing sketches using dot, line and form	2	27.12.2025		TLM6	
	UNIT–II: DESIGN THINKING PROCESS					
4	Design thinking process: Empathy	1	03.1.2026		TLM2	
	Activity: To understand the	2	03.1.2026	03.1.2026	TLM6	

	significance of Empathy					
5	Design thinking process: Define or Analyze	1	17-1-2026		TLM2	
	Activity: To understand the significance of Define/analyze	2	17-1-2026		TLM6	
6	Design thinking process: Ideate	1	24-1-2026		TLM2	
	Activity: To understand the significance of Ideate	2	24-1-2026		TLM6	
7	Design thinking process: Prototype	1	31-1-2026		TLM2	
	Activity: To understand the significance of Prototype	2	31-1-2026		TLM6	
8	Tools of design thinking in social innovations	1	07-2-2026		TLM2	
	Activity: Students should present their understanding of DTI elements using example	2	07-2-2026		TLM6	
	UNIT – III: INNOVATION					
9	Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations	1	21-2-2026		TLM2	
	Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation	2	21-2-2026		TLM6	
	UNIT – IV: PRODUCT DESIGN					
10	Problem formation, introduction to product design, Product strategies,	1	28-02-2026		TLM2	

	Product value					
	Activity: Development of Business models, setting of specifications	2	28-02-2026		TLM6	
11	Product planning, product specifications. Innovation towards product design Case studies.	1	07-3-2026		TLM2	
	Activity: Explaining their own product and model design, case studies	2	07-03-2026		TLM6	
	UNIT – V: DESIGN THINKING IN BUSINESS PROCESSES					
12	Business & Strategic Innovation, Business challenges, Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes	1	21-03-2026		TLM2	
	Activity: Marketing strategies of our own product, its maintenance, Reliability and plan for startup	2	21-03-2026		TLM6	
I Mid Exams: 26-01-2025 to 31-01-2025						
II Mid Exams: 06-04-2025 to 11-04-2025						
No. of classes required to complete: 36				**No. of classes taken:**		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-B

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	**Marks**
Internal Examination	30

Semester End Examination	70
Total Marks:	**100**

ACADEMIC CALENDAR

Commencement of IV Semester Classwork	**09-12-2024**		
Description	**From**	**To**	**Weeks**
I Phase of Instructions	01-12-2024	24-01-2025	8 W
I Mid Examinations	**26-01-2025**	**31-01-2025**	1 W
II Phase of Instructions	02-02-2025	04-04-2025	9 W
II Mid Examinations	**06-04-2025**	**11-04-2025**	1 W
Preparation and Practicals	13-04-2025	18-04-2025	1 W
Semester End Examinations	**20-04-2025**	**02-05-2025**	2 W
Internship	04-05-2025	27-06-2025	8 W
Commencement of V Semester Classwork	**29 –06–2025**		

PART-C

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To possess knowledge in both fundamental and application aspects of mathematical, scientific, engineering principles to analyze complex engineering problems for meeting the national and international requirements and demonstrating the need for sustainable development.
PEO 2	To adapt to the modern engineering tools for planning, analysis, design, implementation of analytical data and assess their relevant significance in societal and legal issues necessary in their professional career.
PEO 3	To exhibit professionalism, ethical attitude, communication, managerial skills, team work and social responsibility in their profession and adapt to current trends by engaging in continuous learning.

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess

	societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques.
PSO 2	Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies.
PSO 3	To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Mrs. D.MANGAMMA**	**Dr. K DEVI PRIYA**	**Dr. B SRINIVASA RAO**	**Dr. S.JAYAPRADA**
Signature				

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.A.V.G.A.MARTHANDA

Course Name	**:** Optimization Techniques	**Course Code :** 23ME09
Credits:	3	**L-T-P Structure:** 2-0-0
Program/Sem/Sec	: B.Tech/IVSemester–EEESection-B	**A.Y.** **:**2025-26

PREREQUISITE: Linear Algebra, Vector Calculus

Course Objectives:
The course aims to equip students with the ability to define objective and constraint functions in terms of design variables for optimization problems, including both single and multi- variable problems with and without constraints. It covers the application of linear programming techniques, including the use of slack and surplus variables in the Simplex method, and the formulation of transportation and assignment problems as linear programming problems. Additionally, the course presents nonlinear programming techniques for both unconstrained and constrained problems, including the use of exterior and interior penalty functions

Course Outcomes: At the end of the course, students will be able to:

CO1: State and formulate optimization problems, with and without constraints, using design variables from an engineering design problem. **(Remember-L1)**

CO2: Apply classical optimization techniques to minimize or maximize a multi-variable objective function, with or without constraints, and arrive at an optimal solution. **(Understand- L2)**

CO3: Apply and solve transportation and assignment problems using the Linear Programming Simplex method. **(Apply-L3)**

CO4: Apply gradient and non-gradient methods to nonlinear optimization problems, using interior or exterior penalty functions for constraints, to derive optimal solutions. **(Apply-L3)**

CO5: Formulate and apply Dynamic Programming techniques to problems such as inventory control, production planning, and engineering design, to reach a final optimal solution from the current optimal solution. **(Analyse-L4)**

COURSE ARTICULATION MATRIX(Correlation between COs, POs & PSOs):

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	2	1									1				
CO2	3	2	2									1				
CO3	3	2										1				
CO4	3	2										1				
CO5	3	2										1				

Textbooks:

1. "Engineering optimization: Theory and practice", S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research", H.S. Kasene& K.D. Kumar, Springer (India), Pvt.LTd.

Reference Books:

1. "Optimization Methods in Operations Research and systems Analysis", by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research, Dr.S.D.Sharma, Kedarnath, Ramnath& Co

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction and Classical Optimization Techniques

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction and Classical Optimization Techniques	1	01-12-2025		TLM1	
2.	Statement of an Optimization problem, design vector, design constraints	2	4-12-2025 5-12-2025		TLM2	
3.	Constraint surface, objective function, objective function surfaces	1	8-12-2025		TLM1	
4.	Classification of Optimization problems. Single variable Optimization	2	11-12-2025 12-12-2025		TLM2	
5.	Multi variable Optimization without constraints, necessary and sufficient conditions for minimum/maximum	2	15-12-2025- 18-12-2025		TLM1	
6.	Multivariable Optimization with equality constraints.	1	19-12-2025		TLM1	
7.	Solution by method of Lagrange multipliers	1	22-12-2025		TLM1	
8.	multivariable Optimization with inequality constraints	1	26-12-2025		TLM1	
9.	Kuhn – Tucker conditions	1	29-12-2025		TLM1	
No. of classes required to complete UNIT-I:				**No. of classes taken:**		

UNIT-II: Linear Programming

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Standard form of a linear programming problem	2	02-01-2026 05-01-2026		TLM2	
11.	geometry of linear programming problems	2	08-01-2026 09-01-2026		TLM2	
12.	definitions and theorems	1	11-01-2026		TLM1	
13.	solution of a system of linear simultaneous equations	2	19-01-2026 22-01-2026		TLM1	
14.	pivotal reduction of a general system of equations motivation to the simplex method simplex algorithm	2	23-01-2026 24-01-2026		TLM1	
15.	MID 1 EXAMS		26-01-2026 TO 31-01-2026		TLM1	
16.		2	02-02-2026 5-02-2026		TLM1	
No. of classes required to complete UNIT-II:				**No. of classes taken:**		

UNIT III: Transportation Problem

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
17.	Finding initial basic feasible solution by north – west corner rule	2	02-02-2026 5-02-2026		TLM2	
18.	least cost method and Vogel's	2	6-02-2026		TLM1	

	approximation method		9-02-2026			
19.	testing for optimality of balanced transportation problems	2	12-02-2026 13-02-2026		TLM1	
20.	Special cases in transportation problem.	2	16-02-2026 19-02-2026		TLM2	
21.		1	23-02-2026		TLM2	
No. of classes required to complete UNIT-III:				**No. of classes taken:**		

UNIT-IV:Nonlinear Programming

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22.	Unconstrained cases, one – dimensional minimization methods: Classification, Fibonacci method	2	02-03-2026 05-03-2026		TLM1	
23.	Univariate method, steepest descent method.	2	9-03-2026 12-03-2026		TLM2	
24.	Constrained cases– Characteristics of a constrained problem	1	13-03-2026		TLM1	
25.	Classification, Basic approach of Penalty Function method	2	16-03-2026 19-03-2026		TLM1	
26.	Basic approaches of Interior penalty function methods.	1	20-03-2026		TLM2	
27.	Basic approaches of Exterior penalty function methods.	1	23-03-2026		TLM2	
No. of classes required to complete UNIT-IV:				**No. of classes taken:**		

UNIT-V:Dynamic Programming

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	Dynamic programming multistage decision	1	26-03-2026		TLM1	
29.	Dynamic programming multistage decision types	1	27-03-2026		TLM2	
30.	Dynamic programming concept of sub optimization and the principle of optimality	1	27-03-2026		TLM1	
31.	Computational procedure in dynamic programming,	1	30-03-2026		TLM2	
32.	examples illustrating the calculus method of solution	1	02-04-2026		TLM1	
33.	Examples illustrating the tabular method of solution. Review of UNIT-III, IV & V	3	02-04-2026 To 03-04-2026		TLM1	
No. of classes required to complete UNIT-V:				**No. of classes taken:**		

CONTENT BEYOND SYLLABUS:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods
1	Introduction to meta-heuristic optimization	1	27-03-25 30-03-2025		TLM2

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (UNIT-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, IV & V)	Q2=10
Mid Marks =80% of Max((M1+Q1+A1),(M2+Q2+A2))+20% of Min((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques.
PSO 2	Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies.
PSO 3	To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems.

ACADEMIC CALENDAR: A.Y 2024-25

Description	**From**	**To**	**Weeks**
I Phase of Instructions	01-12-2025	24-01-2026	7W
I Mid Examinations	**26-01-2026**	**31-01-2026**	**1 W**
II Phase of Instructions	02-02-2026	4-04-2026	9W
II Mid Examinations	**06-04-2026**	**11-04-2026**	**1 W**
Preparation and Practical	13-04-2026	18-04-2026	1 W
Semester End Examinations	**20-04-2026**	**27-04-2026**	**2 W**

Signature				
Name of the Faculty	Dr.A.V.G.A.MARTHANDA	**Dr.M.S.Giridhar**	**Dr.M.S.Giridhar**	**Dr.P.SOBHA RANI**
Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**

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Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
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Phone: 08659-222933, Fax: 08659-222931

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM : II B. Tech., II-Sem., AIML B
ACADEMIC YEAR : 2025-26
COURSE NAME & CODE : PROBABILITY & STATISTICS
L-T-P STRUCTURE : 3-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mrs. K. N. V. Lakshmi
COURSE COORDINATOR : Dr. D. Vijay Kumar
PRE-REQUISITES : Basics of mathematics

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To familiarize the students with the foundations of probability and statistical methods
- To impart probability concepts and statistical methods in various applications Engineering

COURSE OUTCOMES (COs): Upon successful completion of this course, the student should be able to

CO1: Classify the concepts of data science and its importance (L2)
CO2: Interpret the association of characteristics and through correlation and regression tools (L3)
CO3: Apply discrete and continuous probability distributions (L3)
CO4: Design the components of a classical hypothesis test (L4)
CO5: Infer the statistical inferential methods based on small and large sampling tests (L4)

COURSE ARTICULATION MATRIX (Correlation between Cos &POs, PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	-	-	-	-	-	-	2
CO2	3	3	2	3	-	-	-	-	-	-	-	2
CO3	3	3	2	3	-	-	-	-	-	-	-	2
CO4	3	2	2	3	-	-	-	-	-	-	-	2
CO5	3	3	2	3	-	-	-	-	-	-	-	2

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2** – Moderate (Medium), **3** - Substantial (High).

BOS APPROVED TEXT BOOKS:

1. **Miller and Freund's,** Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S. **C. Gupta and V.K. Kapoor,** Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

BOS APPROVED REFERENCE ROOKS:

1. **Shron L. Myers, Keying Ye, Ronald E Walpole,** Probability and Statistics for Engineers and the Scientists, 8th Edition. Pearson 2007.
2. **Jay 1. Devore,** Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. **Sheldon M. Ross,** Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.
4. **Johannes Ledolter and Robert V. Hogg,** Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Descriptive statistics and methods for data science

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction class	1	01/12/2025		TLM1	CO1	T1, T2	
2.	Syllabus Co's, PO's	1	02/12/2025		TLM1	CO1	T1, T2	
3.	Unit-1, Introduction to data science	1	05/12/2025		TLM1	CO1	T1, T2	
4.	Statistics- Population and sample, Collection of data,	1	06/12/2025		TLM1	CO1	T1, T2	
5.	Types of variables	1	08/12/2025		TLM1	CO1	T1, T2	
6.	Data visualization	1	09/12/2025		TLM1	CO1	T1, T2	
7.	Measures of central tendency, A.M	1	12/12/2025		TLM1	CO1	T1, T2	
8.	Median, mode problems	1	15/12/2025		TLM1	CO1	T1, T2	
9.	Measures of variability Range, Mean deviation	1	16/12/2025		TLM1	CO1	T1, T2	
10.	S.D. & Q D	1	19/12/2025		TLM1	CO1	T1, T2	
11.	Skewness	1	20/12/2025		TLM1	CO1	T1, T2	
12.	Kurtosis	1	22/12/2025		TLM1	CO1	T1, T2	
13.	Tutorial	1	23/12/2025		TLM3	CO1	T1, T2	
No. of classes required to complete UNIT-I		13			No. of classes taken:			

UNIT-II: Correlation and Regression

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
14.	Correlation, types	1	26/12/2025		TLM1	CO2	T1, T2	
15.	Coefficient of correlation	1	27/12/2025		TLM1	CO2	T1, T2	
16.	Rnak correlation	1	29/12/2025		TLM1	CO2	T1, T2	
17.	Linear regression (lines)	1	30/12/2025		TLM1	CO2	T1, T2	
18.	Problems	1	02/01/2026		TLM1	CO2	T1, T2	
19.	Multiple regression	1	03/01/2026		TLM1	CO2	T1, T2	
20.	Regression coefficients	1	05/01/2026		TLM1	CO2	T1, T2	
21.	Properties, problems	1	06/01/2026		TLM1	CO2	T1, T2	
22.	Fitting of parabola	1	09/01/2026		TLM1	CO2	T1, T2	
23.	Exponential curve	1	17/01/2026		TLM1	CO2	T1, T2	
24.	Fitting of power curve	1	19/01/2026		TLM1	CO2	T1, T2	
25.	Tutorial II	1	20/01/2026		TLM3	CO2	T1, T2	
26.	Problems	1	23/01/2026		TLM1	CO2	T1, T2	
27.	Revision	1	24/01/2026		TLM1	CO2	T1, T2	
No. of classes required to complete UNIT-II		14			No. of classes taken:			

I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)

UNIT-III: Probability and Distributions

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
28.	Probability, Introduction	1	02/02/2026		TLM1	CO3	T1, T2	
29.	Conditional probability	1	03/02/2026		TLM1	CO3	T1, T2	
30.	Bayes theorem	1	06/02/2026		TLM3	CO3	T1, T2	
31.	Problems	1	07/02/2026		TLM1	CO3	T1, T2	
32.	Random variables, Distribution function	1	09/02/2026		TLM1	CO3	T1, T2	
33.	Probability mass function	1	10/02/2026		TLM1	CO3	T1, T2	
34.	Probability density function	1	14/02/2026		TLM1	CO3	T1, T2	
35.	Mathematical expectation, variance	1	16/02/2026		TLM3	CO3	T1, T2	
36.	Binomial distribution	1	17/02/2026		TLM1	CO3	T1, T2	
37.	Poisson distribution	1	20/02/2026		TLM1	CO3	T1, T2	
38.	Normal distribution	1	21/02/2026		TLM1	CO3	T1, T2	
39.	Uniform distribution	1	23/02/2026		TLM3	CO3	T1, T2	
No. of classes required to complete UNIT-III		12			No. of classes taken:			

UNIT-IV: Sampling Distribution

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
40.	Introduction: population & sample Sampling distribution	1	24/02/2026		TLM1	CO4	T1, T2	
41.	Sampling distribution of means & variance	1	27/02/2026		TLM1	CO4	T1, T2	
42.	problems	1	28/02/2026		TLM1	CO4	T1, T2	
43.	Central limit theorem	1	02/03/2026		TLM3	CO4	T1, T2	
44.	Estimation- point & interval, maximum error	1	03/03/2026		TLM1	CO4	T1, T2	
45.	Estimation using t-distribution	1	06/03/2026		TLM1	CO4	T1, T2	
46.	problems	1	07/03/2026		TLM3	CO4	T1, T2	
47.	Estimation using F-distribution	1	09/03/2026		TLM1	CO4	T1, T2	
48.	Estimation using χ^2 −distribution	1	10/03/2026		TLM1	CO4	T1, T2	
No. of classes required to complete UNIT-IV		9			No. of classes taken:			

UNIT-V: Test of Hypothesis

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
49.	Hypothesis: introduction, Definitions	1	13/03/2026		TLM1	CO5	T1, T2	

50.	Z-test for single mean	1	16/03/2026		TLM1	CO5	T1, T2	
51.	Z-test for diff. of mean	1	17/03/2026		TLM3	CO5	T1, T2	
52.	Z-test for single proportion	1	20/03/2026		TLM1	CO5	T1, T2	
53.	Z-test for difference of proportion	1	23/03/2026		TLM1	CO5	T1, T2	
54.	t-test for single mean	1	24/03/2026		TLM1	CO5	T1, T2	
55.	t-test for diff. means,	1	27/03/2026		TLM1	CO5	T1, T2	
56.	F-test for variances	1	28/03/2026		TLM1	CO5	T1, T2	
57.	χ^2 −test for goodness of fit	1	30/03/2026		TLM1	CO5	T1, T2	
58.	χ^2 −test for independence	1	04/04/2026		TLM1	CO5	T1, T2	
No. of classes required to complete UNIT-V		10			No. of classes taken:			

Content beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
59.	Paired t-test	1	27/03/2026		TLM1	CO5	T1, T2	
No. of classes		1			No. of classes taken:			
II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)								

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/SwayamPrabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE):	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

K. N. V. Lakshmi	**Dr. D. Vijay Kumar**	**Dr. A. Rami Reddy**	**Dr. T. Satyanarayana**
Course Instructor	Course Coordinator	Module Coordinator	HOD

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. SHAIK JAMEER
Course Name & Code : MACHINE LEARNING & 23AM01
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B. Tech/IV/B **A.Y.:** 2025-26

PREREQUISITES : **Probability and Statistics, Data Warehousing and Data Mining**

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objectives of the course are to

- Define machine learning and its different types (supervised and unsupervised) and understand their applications.
- Apply supervised learning algorithms including decision trees and k-nearest neighbours (k-NN).
- Implement unsupervised learning techniques, such as K-means clustering

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Understand development steps of model building and evaluation approaches. **(Understand-L2**
CO2	Apply Nearest Neighbor-based models to solve real-time regression and classification problems **(Apply-L3)**
CO3	Make use of supervised learning algorithms to solve classification problems **(Apply-L3)**
CO4	Apply linear discriminants and perceptron classifiers to classify datasets **(Apply-L3)**
CO5	Apply various clustering techniques to solve complex problems **(Apply-L3)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	-	-	-	-	-	-	-	1	1	-	3
CO2	3	2	-	2	2	-	-	-	-	-	-	2	2	-	-
CO3	2	3	2	2	2	-	-	-	-	-	-	2	-	2	2
CO4	2	2	-	2	2	-	-	-	-	-	-	2	2	2	-
CO5	2	2	2	2	2	-	-	-	-	-	-	2	2	2	-
1 - Low **2 –**Medium **3 -** High															

TEXTBOOKS:

T1 "Machine Learning Theory and Practice", M N Murthy, V S Ananthanarayana, Universities Press (India), 2024.

REFERENCE BOOKS:

R1 "Machine Learning", TomM. Mitchell, McGraw-Hill Publication, 2017

R2 "Machine Learning in Action", Peter Harrington, Dream Tech.

R3 "Introduction to Data Mining", Pang-Ning Tan, Michel Stenbach, Vipin Kumar, 7th Edition, 2019.

Web Resources: https://nptel.ac.in/courses/106106139

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Machine Learning

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and COs	1	02-12-2025		TLM1,2	
2.	Evolution of Machine Learning, Paradigms for ML	2	03-12-2025 04-12-2025		TLM1,2	
3.	Learning by Rote, Learning by Induction	1	06-12-2025		TLM1,2	
4.	Reinforcement Learning, Types of Data	1	09-12-2025		TLM1,2	
5.	Matching, Stages in Machine Learning,	1	10-12-2025		TLM1,2	
6.	Data Acquisition, Feature Engineering,	1	11-12-2025		TLM1,2	
7.	Data Representation, Model Selection	1	16-12-2025		TLM1,2	
8.	Model Learning, Model Evaluation	1	17-12-2025		TLM1,2	
9.	Model Prediction, Search and Learning, Data Sets.	1	18-12-2025		TLM1,2	
10.	**UNIT TEST-1**	1	20-12-2025		TLM1,2	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Nearest Neighbor-Based Models

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Proximity Measures	1	23-12-2025		TLM1,2	
2.	Distance Measures, Non-Metric Similarity Functions,	2	24-12-2025 27-12-2025		TLM1,2	
3.	Proximity Between Binary Patterns	1	30-12-2025		TLM1,2	
4.	Different Classification Algorithms Based on the Distance Measures	2	31-12-2025 03-01-2026		TLM1,2	
5.	K-Nearest Neighbor Classifier	1	06-01-2026		TLM1,2	
6.	Radius Distance Nearest Neighbor Algorithm	1	07-01-2026		TLM1,2	
7.	KNN Regression, Performance of Classifiers	1	08-01-2026		TLM1,2	
8.	Performance of Regression Algorithms	1	10-01-2026		TLM1,2	
9.	**Unit Test-2**	1	20-01-2026		TLM1,2	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		
MID-1(26.01.2026 to 31.01.2026)						

UNIT-III: Models Based on Decision Trees

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Decision Trees for Classification	1	21-01-2026		TLM1,2	
2.	Impurity Measures ,Properties	1	22-01-2026		TLM1,2	
3.	Regression Based on Decision Trees	1	24-01-2026		TLM1,2	
4.	Bias–Variance Trade-off,	1	03-02-2026		TLM1,2	
5.	Random Forests for Classification and Regression	2	04-02-2026 05-02-2026		TLM1,2	
6.	The Bayes Classifier: Introduction to the Bayes Classifier	2	07-02-2026 10-02-2026		TLM1,2	
7.	Bayes' Rule and Inference,	2	11-02-2026 12-02-2026		TLM1,2	
8.	The Bayes Classifier and its Optimality	2	17-02-2026 18-02-2026		TLM1,2	
9.	Multi-Class Classification | Class Conditional Independence and Naive Bayes Classifier (NBC)	2	19-02-2026 21-02-2026		TLM1,2	
No. of classes required to complete UNIT-III: 14				**No. of classes taken:**		

UNIT-IV: Linear Discriminants for Machine Learning

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Linear Discriminants	1	24-02-2026		TLM1,2	
2.	Linear Discriminants for Classification	1	25-02-2026		TLM1,2	
3.	Perceptron Classifier, Perceptron Learning Algorithm	2	26-02-2026 28-02-2026		TLM1,2	
4.	Support Vector Machines, Linearly Non-Separable Case	2	03-03-2026 05-03-2026		TLM1,2	
5.	Non-linear SVM, Kernel Trick	1	07-03-2026		TLM1,2	
6.	Logistic Regression, Linear Regression	1	10-03-2026		TLM1,2	
7.	Multi-Layer Perceptrons (MLPs)	1	11-03-2026		TLM1,2	
8.	Backpropagation for Training an MLP.	1	12-03-2026		TLM1,2	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Clustering

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Clustering	1	14-03-2026		TLM1,2	
2.	Partitioning of Data, Matrix Factorization	1	17-03-2026		TLM1,2	
3.	Clustering of Patterns, Divisive Clustering,	1	18-03-2026		TLM1,2	
4.	Agglomerative Clustering, Partitional Clustering,	1	24-03-2026		TLM1,2	
5.	K-Means Clustering	1	25-03-2026		TLM1,2	
6.	Soft Partitioning, Soft Clustering	1	28-03-2026		TLM1,2	
7.	Fuzzy C-Means Clustering, Rough Clustering,	1	31-03-2026		TLM1,2	
8.	Rough K-Means Clustering Algorithm,	1	01-04-2026		TLM1,2	
9.	Expectation Maximization-Based Clustering, Spectral Clustering	1	02-04-2026		TLM1,2	
No. of classes required to complete UNIT-V: 09				**No. of classes taken:**		

CONTENT BEYOND THE SYLLABUS:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Combining Inductive and Analytical Learning	1	02-04-2026		TLM1,2	
2.	Case Study of Analytics Learning	1	04-04-2026		TLM1,2	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT(NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (Unit-III, IV & V)	M2=15
II-Quiz Examination (Unit-III, IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs)

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques.
PSO 2	Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies.
PSO 3	To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr. Shaik Jameer**	**Dr. Shaik Jameer**	**Dr. Salma Asiya Begum**	**Dr. S Jayaprada**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs.Razeena Begum
Course Name & Code : DATABASE MANAGEMENT SYSTEMS & 23CS03
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech/ IV/B **A.Y.:** 2025-2026

PREREQUISITE: Data Structures

COURSE EDUCATIONAL OBJECTIVES (CEOs): The Objective of this course is to know about basic concepts of DBMS, Database Languages, Database Design, Normalization Process, Transaction Processing, Indexing, and Interfacing with NOSQL using MongoDB.

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Understand the foundation of database management system and various data models. (Understand-L2)
CO2	Identify relational model concepts, implement various constraints, perform SQL queries and DML operations. (Understand-L2)
CO3	Apply SQL queries, functions, and work with nested queries, grouping, joins, views, and set operations. (Apply-L3)
CO4	Apply various normalization techniques for efficient data handling. (Apply-L3)
CO5	Understand Transaction management, recovery & indexing techniques. (Understand-L2)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	2	1	-	-	-	-	-	-	-	-	-	3	-	-
CO5	2	3	1	-	-	-	-	-	-	-	-	-	3	-	-
1 - Low			**2 –**Medium						**3 -** High						

TEXTBOOKS:

T1 Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke,
TMH (For Chapters 2, 3, 4)

T2 Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan,TMH (For Chapter 1 and Chapter 5)

REFERENCE BOOKS:

R1 Introduction to Database Systems, 8thedition, C J Date, Pearson.

R2 Database Management System, 6th edition, RamezElmasri, Shamkant B. Navathe, Pearson

R3 Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

Web Resources:

1. https://nptel.ac.in/courses/106/105/106105175/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012758066672820 22456_shared/overview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	CEOs and COs discussion, **Introduction:** An overview of Database Management System	1	02-12-2025		1 & 2	
2.	Database Systems	1	03-12-2025		1 & 2	
3.	Characteristics(Database Vs File System)	1	04-12-2025		1 & 2	
4.	Database Users, Advantages of Database systems	1	06-12-2025		1 & 2	
5.	Database applications	1	09-12-2025		1 & 2	
6.	Brief introduction of different Data Models	1	10-12-2025		1 & 2	
7.	TUTORIAL	1	11-12-2025		1 & 2	
8.	Concepts of Schema ,Instance and data independence	1	13-12-2025		1 & 2	
9.	Three tier schema architecture for data independence	1	16-12-2025		1 & 2	
10	Database system structure	1	17-12-2025		1 & 2	
11.	Environment, Centralized architecture for the database.	1	18-12-2025		1 & 2	
12.	Client Server architecture for the database.	1	20-12-2025		1 & 2	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Entity Relationship Model& Relational Model

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction, Representation of entities.	1	23-12-2025		1 & 2	
14.	Attributes, entity set, relationship, relationship se.t	1	24-12-2025		1 & 2	
15.	Constraints, sub classes, super class.	1	27-12-2025		1 & 2	
16.	Inheritance, specialization, generalization using ER Diagrams.	1	30-12-2025		1 & 2	
17.	Introduction to relational model.	1	31-12-2025		1 & 2	
18.	Concepts of domain, attribute, tuple, relation, importance of null values.	1	03-01-2026		1 & 2	
19.	TUTORIAL	1	06-01-2026		1 & 2	
20.	Constraints (Domain, Key constraints, integrity constraints) and their importance.	3	07-01-2026 20-01-2026		1 & 2	
21.	Relational Algebra.	1	21-01-2026		1 & 2	
22.	Relational Calculus.	2	22-01-2026 24-01-2026		1 & 2	
No. of classes required to complete UNIT-II: 13				**No. of classes taken:**		

UNIT-III: SQL

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
I MID EXAMINATIONS(26-01-2026 TO 31-01-2026)						
23.	BASIC SQL: Simple Database schema, data types	1	03-02-2026		1 & 2	
24.	Table definitions (create, alter), different DML operations (insert, delete, update).	1	04-02-2026		1 & 2	
25.	SQL querying (select and project) using where clause, arithmetic & logical operations	1	05-02-2026		1 & 2	
26.	SQL functions (Date and Time, Numeric, String conversion). Creating tables with relationship, implementation of key and integrity constraints	1	07-02-2026		1 & 2	
27.	Nested queries, sub queries, grouping, Aggregation, ordering	1	10-02-2026		1 & 2	
28.	TUTORIAL	1	11-02-2026		1 & 2	
29.	Implementation of different types of joins, view(updatable and non-updatable), relational set operations.	1	17-02-2026		1 & 2	
No. of classes required to complete UNIT-III: 07				**No. of classes taken:**		

UNIT-IV: Schema Refinement (Normalization)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
30.	Purpose of Normalization or schema refinement	1	18-02-2026		1 & 2	
31.	Concept of functional dependency	2	19-02-2026 21-02-2026		1 & 2	
32.	TUTORIAL	1	24-02-2026		1 & 2	
33.	Normal forms based on functional dependency	1	25-02-2026		1 & 2	
34.	Lossless join and dependency preserving decomposition	1	26-02-2026		1 & 2	
35.	1NF, 2NF and 3 NF	1	28-02-2026		1 & 2	
36.	Concept of surrogate key	1	03-03-2026		1 & 2	
37.	TUTORIAL	1	05-03-2026		1 & 2	
38.	Boyce- Codd normal form (BCNF)	1	07-03-2026		1 & 2	
39.	MVD	1	10-03-2026		1 & 2	
40.	Fourth normal form(4NF)	1	11-03-2026		1 & 2	
41.	Fifth Normal Form (5NF)	1	12-03-2026		1 & 2	
No. of classes required to complete UNIT-IV: 13				**No. of classes taken:**		

UNIT-V: Transaction Processing and Concurrency Control

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Transaction State, ACID properties.	1	17-03-2026		1 & 2	
43.	Concurrent Executions, Serializability, Recoverability.	1	18-03-2026		1 & 2	
44.	Implementation of Isolation, Testing for Serializability.	1	24-03-2026		1 & 2	
45.	Two-Phase Locking Techniques for concurrency control: Types of Locks, Time stamp-based locking.	2	25-03-2026 28-03-2026		1 & 2	
46.	Introduction to Recovery Protocols: Recovery Concepts.	1	31-03-2026		1 & 2	
47.	No-UNDO/REDO Recovery Based on Deferred Update.	1	01-04-2026		1 & 2	
48.	Recovery Techniques Based on Immediate Update	1	02-04-2026		1 & 2	
49.	Shadow Paging, ARIES ,Introduction to Indexing: Hash based Indexing.	1	04-04-2026		1 & 2	
II MID EXAMINATIONS(06-04-2026 TO 11-04-2026)						
No. of classes required to complete UNIT-V: 09				**No. of classes taken:**		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques.
PSO 2	Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies.
PSO 3	To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mrs.Razeena Begum**	**Dr.M.Srinivasa Rao**	**Dr.B.Srinivasa Rao**	**Dr.S.Jayaprada**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING(AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: D. MANGAMMA
Course Name & Code : DL&CO 23IT01
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : II B.Tech., IV-Sem, B-Sec **A.Y.: 2025-26**

Prerequisites:

Course Objectives: The main objectives of the course is to

1. Provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals.
2. Describe memory hierarchy concepts.
3. Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices.

COURSE OUTCOMES (COs): At the end of the course, students will be able to

CO1	Evaluate digital number systems and use Boolean algebra theorems, Properties and Canonical forms for digital logic circuit design. **(Understand- L2)**
CO2	Design Sequential logic circuits and understand basic functional blocks a computer system . **(Apply- L3)**
CO3	Understand computer architecture and Data representation to perform computer arithmetic operations and processor organization. **(Understand- L2)**
CO4	Analyze the memory hierarchy in a computer system. **(Understand- L2)**
CO5	Understand the I/O operations and the interfaces **(Understand-L2)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

CO	Program Outcomes (POs)												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	1	1	-	-	-	-	-	-	-	-	-	1	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	-	2	-
CO3	3	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	-	1	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-

Textbooks:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 6th edition, McGraw Hill

2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education.
3. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.

Reference Books:
1. Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson
2. Computer Organization and Design, David A. Paterson, John L.Hennessy, Elsevier
3. Fundamentals of Logic Design, Roth, 5thEdition, Thomson

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Number systems, Logic gates and Boolean algebra, Combinational circuits

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to DLD	3	01-012-2025 02-12-2025 02-12-2025		TLM1	
2.	Number systems	1	03-12-2025		TLM1	
3.	Different Number systems	1	08-12-2025		TLM1	
4.	Conversions of one number to another number	2	09-12-2025 09-12-2025		TLM1	
5.	Data Representations	1	10-12-2025		TLM1	
6.	Binary codes	2	15-12-2025 16-12-2025		TLM1	
7.	Basic Logic gates and Universal gates	2	16-12-2025 17-12-2025		TLM1	
8.	Boolean Logic functions	2	22-12-2025 23-12-2025		TLM1	
9.	K-Maps Simplications	3	23-12-2025 24-12-2025 29-12-2025		TLM1	
10.	Combinational circuits, Desing Decoder and Multiplexers	1	30-12-2025		TLM1	
No. of classes required to complete UNIT-I: 18				**No. of classes taken:**		

UNIT-II: Sequential Logic Circuits, Basic structure of computer, Computer generations

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
11.	Introduction to sequential circuits,	1	29-07-2025		TLM1	
12.	Flip-flops(RS,J,T,D),	2	30-12-2025 31-12-2025		TLM1	
13.	Master slave flip-flop	1	05-01-2026		TLM1	
14.	Conversion of flip-flops, Truth & excitation tables	2	06-01-2026 06-01-2026		TLM1	
15.	Registers	1	07-01-2026		TLM1	
16.	counters	1	12-01-2026		TLM1	
17.	Basic structure of computer	2	19-01-2026 20-01-2026		TLM1	
18.	Bus structure	1	20-01-2026		TLM1	
19.	Multi processors and multi computers	1	21-01-2026		TLM1	
20.	Computer generations	1	02-02-2026		TLM1	
21.	Von- Neumann Architecture	2	03-02-2026 03-02-2026		TLM2	
No. of classes required to complete UNIT-II: 15				**No. of classes taken:**		

UNIT-III: Data Representation, Processor Organization

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22.	Signed Number representation	1	04-02-2026		TLM2	
23.	Addition and Subtraction of Signed Numbers	1	02-02-2026		TLM2	
24.	Design of Fast Adders	1	09-02-2026		TLM2	
25.	Multiplication of Positive Numbers	1	10-02-2026		TLM2	
26.	Signed-operand Multiplication	1	10-02-2026		TLM2	
27.	Fast Multiplication	1	11-02-2026		TLM2	
28.	Integer Division,	1	16-02-2026		TLM2	
29.	Floating-Point Numbers and Operations	1	23-02-2026		TLM2	
30.	Processor Organization of Fundamental Concepts	1	24-02-2026		TLM2	
31.	Execution of a Complete Instruction	1	24-02-2026		TLM2	
32.	Multiple-Bus Organization	1	25-02-2026		TLM2	
33.	Hardwired Control	1	02-03-2026		TLM2	
34.	Micro programmed Control	1	03-03-2026		TLM2	
No. of classes required to complete UNIT-III: 13				**No. of classes taken:**		

UNIT-IV: Memory organization, Virtual Memories

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
35.	Memory organization	1	03-03-2026		TLM2	
36.	Semiconductor RAM Memories	1	09-03-2026		TLM2	
37.	Concept of memory hierarchical organization, Read-Only Memories	1	10-03-2026		TLM2	
38.	Speed, Size and Cost, Cache memory	1	10-03-2026		TLM2	
39.	Virtual Memories	1	11-03-2026 16-03-2026		TLM2	
40.	Memory Management Requirements, Secondary Storage	2	17-03-2026 17-03-2026		TLM2	
No. of classes required to complete UNIT-IV: 7				**No. of classes taken:**		

UNIT-V: Input/output Organization: & Peripheral devices, DMA

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Input/Output Organization: Accessing I/O Devices	1	18-03-2026		TLM2	
42.	Interrupts, Processor Examples	1	30-03-2026		TLM2	
43.		1	31-03-2026		TLM2	
44.	Interface Circuits	1	31-03-2026		TLM2	
45.	Peripheral devices –I/O sub-systems	2	01-04-2026		TLM2	
46.	I/O device interface, I/O transfers-program controlled	2	02-04-2026		TLM2	
47.	Interrupt driven	2	03-04-2026		TLM2	
48.	DMA	1	04-04-2025		TLM2	
I Mid Exams: 26-01-2025 to 31-01-2025						
II Mid Exams: 06-04-2025 to 11-04-2025						
No. of classes required to complete UNIT-V: 11				**No. of classes taken:**		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III ,IV & V)	A2=5
II- Descriptive Examination (Unit-III ,IV & V)	M2=15
II-Quiz Examination (Unit-III ,IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex

	engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineer**ing and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques.
PSO 2	Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies.
PSO 3	To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Mrs. D. MANGAMMA**	**Dr B RAJENDRA PRASAD**	**Dr.B. SRINIVASA RAO**	**Dr. S. JAYAPRADA**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. SHAIK JAMEER
Course Name & Code : MACHINE LEARNING LAB & 23AM51
L-T-P Structure : **3-0-0** **Credits:** 1.5
Program/Sem/Sec : B. Tech/IV/B **A.Y.:** 2025-26

PREREQUISITE: Probability and Statistics, Programming Knowledge

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objectives of this lab are

- To learn about computing central tendency measures and Data preprocessing techniques
- To learn about classification and regression algorithms
- To apply different clustering algorithms for a problem

Course Outcomes: This Course will enable students to

CO1	Apply the appropriate pre-processing techniques on data set. **(Apply – L3)**
CO2	Implement supervised Machine Learning algorithms**. (Apply – L3)**
CO3	Implement advanced Machine Learning algorithms. **(Apply – L3)**
CO4	Improve individual / teamwork skills, communication & report writing skills with ethical values.

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO2	PSO3
CO1	1	2	1	-	-	-	-	-	-	-	-	1	1	-	3
CO2	1	2	-	2	2	-	-	-	-	-	-	2	2	-	-
CO3	2	3	2	2	2	-	-	-	-	-	-	2	-	2	2
CO4	-	-	-	-	-	-	-	2	2	2	-	2	2	2	-
1 - Low **2 –**Medium **3 -** High															

Note: Enter Correlation Levels 1 or 2 or 3. If there is no correlation, put '-' 1- Slight (Low), 2 – Moderate (Medium), 3 - Substantial (High)

TEXTBOOKS:

T1 "Machine Learning Theory and Practice", M N Murthy, V S Ananthanarayana, Universities Press (India), 2024.

REFERENCE BOOKS:

R1 "Machine Learning", Tom M. Mitchell, McGraw-Hill Publication, 2017
R2 "Machine Learning in Action", Peter Harrington, Dream Tech.
R3 "Introduction to Data Mining", Pang-Ning Tan, Michel Stenbach, Vipin Kumar, 7th Edition, 2019.

Web Resources:

1. https://nptel.ac.in/courses/106106139

2. https://www.analyticsvidhya.com/blog/2021/07/basic-statistics-concepts-for-machine-learning

3. https://notepub.io/notes/programming-languages/python-for-data-science/python-for-data-science

4. https://www.analyticsvidhya.com/blog/2021/10/handling-missing-value/

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation.	3	04-12-2025		TLM4	
2	Apply the following Pre-processing techniques for a given dataset. a. Attribute selection b. Handling Missing Values c. Discretization d. Elimination of Outliers	3	11-12-2025		TLM4	
3	Apply KNN algorithm for classification and regression	3	18-12-2025		TLM4	
4	Demonstrate decision tree algorithm for a classification problem and perform parameter tuning for better results	3	18-12-2025		TLM4	
5	Demonstrate decision tree algorithm for a regression problem Apply Random Forest algorithm for classification and regression	3	08-01-2026		TLM4	
6	Demonstrate Naïve Bayes Classification algorithm. Apply Support Vector algorithm for classification	3	22-01-2026		TLM4	

7	Demonstrate simple linear regression algorithm for a regression problem	3	05-02-2026		TLM4	
8	Apply Logistic regression algorithm for a classification problem	3	12-02-2026		TLM4	
9	Demonstrate Multi-layer Perceptron algorithm for a classification problem	3	19-02-2026		TLM4	
10	Implement the K-means algorithm and apply it to the data you selected.	3	26-02-2026		TLM4	
11	Evaluate performance by measuring the sum of the Euclidean distance of each example from its class center. Test the performance of the algorithm as a function of the parameters K.	3	05-03-2026		TLM4	
12	Demonstrate the use of Fuzzy C-Means Clustering	3	12-03-2026		TLM4	
13	Demonstrate the use of Expectation Maximization based clustering algorithm	3	12-03-2026		TLM4	
14	Internal Examination	3	02-04-2026		TLM4	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Day to Day Work:	15
Internal Test	15
Continuous Internal Assessment	30
Procedure	20
Execution & Results	30
Viva-voce	20
Semester End Examination [SEE]	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11	**project management and finance**: demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques.
PSO 2	Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies.
PSO 3	To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. Shaik Jameer**	**Dr. Shaik Jameer**	**Dr. Salma Asiya Begum**	**Dr. S Jayaprada**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT
PART-A

Name of Course Instructor: Mrs. Razeena Begum
Course Name & Code **:** Database Management Systems Lab (23CS56)
L-T-P Structure **:** 0-0-3 **Credits:** 1.5
Program/Sem/Sec : B.Tech /IV/B **A.Y:** 2025-2026

PRE-REQUISITE : Programming language, Discrete Mathematical Structures, and Data Structures.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this lab is to provide a strong formal foundation in database concepts, technology, and practice to the participants to groom them into well-informed database application developers.

COURSE OUTCOMES (COs): At the end of the course, students are able to

CO 1	Implement SQL queries using DDL/DML commands.(Apply-L3)
CO 2	Apply different Integrity constraints & Normalization techniques for effective database design. .(Apply-L3)
CO 3	Implement PL/SQL including procedures, functions, cursors and triggers. .(Apply-L3)
CO 4	Improve individual / teamwork skills, communication & report writing skills with ethical values.

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	2	-	2	-	-	-	-	-	-	-	3	-
CO2	-	1	1	1	1	-	-	-	-	-	-	-	3	-
CO3	3	-	1	1	1	-	-	-	-	-	-	-	3	-
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Introduction to SQL, syntax	3	08-12-2025		TLM4	
2	Experiment - 1	3	15-12-2025		TLM4	
3	Experiment - 2	3	22-12-2025		TLM4	
4	Experiment - 3	3	29-12-2025		TLM4	
5	Experiment - 4	3	05-01-2026		TLM4	
6	Experiment – 5,6,7,8	6	19-01-2026 & 02-02-2026		TLM4	
7	Experiment – 9,10,11	6	09-02-2026 & 16-02-2026		TLM4	
8	Experiment – 12,13	6	23-02-2026 & 02-03-2026		TLM4	
9	Experiment – 14	3	09-03-2026		TLM4	
10	Experiment – 15	3	16-03-2026		TLM4	
11	Design database for Case study	3	23-03-2026		TLM4	
12	Internal Exam	3	30-03-2026		TLM4	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulations):

According to Academic Regulations of R23 Distribution and Weightage of Marks For Laboratory Courses is as follows

(a) Continuous Internal Evaluation (CIE): The Continuous Internal Evaluation (CIE) is based on the following parameters:

Parameter	Marks
Day to Day work	10
Record	05
Internal Test	15
Total	30

(b) Semester End Examinations (SEE: The Semester End examinations (SEE) for laboratory courses shall be jointly conducted by internal and external examiners with 3 hours duration and evaluated for 70 marks.

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques.
PSO 2	Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies.
PSO 3	To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mrs. Razeena Begum**	**Dr. M .Srinivasa Rao**	**Dr. B. Srinivasa Rao**	**Dr . S. Jayaprada**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING(AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs. K.RAJASREE

Course Name & Code : FULL SATCK DEVELOPMENT-I & 23CSS2

L-T-P Structure : 0-1-2 **Credits:** 2

Program/Sem/Sec : II B.Tech/IV/B **A.Y.:** 2025-26

Pre-requisite: Knowledge of basic Computer hardware & software.

COURSE EDUCATIONAL OBJECTIVE:

The main objectives of the course are to

- Make use of HTML elements and their attributes for designing static web pages
- Build a web page by applying appropriate CSS styles to HTML elements
- Experiment with JavaScript to develop dynamic web pages and validate forms

Course Outcomes: After successful completion of the course the students are able to

CO1: Design static web pages by using HTML elements. (Apply-L3)

CO2: Develop a web page by applying appropriate CSS styles to HTML elements. (Apply-L3)

CO3: Develop dynamic web pages and validate forms using JavaScript. (Apply-L3)

CO4: Improve individual / teamwork skills, communication & report writing skills with ethical values

COURSE ARTICULATION MATRIX (Correlation between Cos, Pos & PSOs):

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	3										3
CO2	3	2	2	1	3										3
CO3	3	2	2	1	3										3
CO4								2	2	2	2	2			

Note: 1- Slight (Low), **2 -** Moderate (Medium), **3 -** Substantial (High)

PART B

COURSE DELIVERY PLAN(LESSON PLAN):

S. No.	Topics to be covered	No.of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	Introduction to Web and its applications & basic tags inHTML programming	3	06-12-2025		
2.	Lists, Links and Images	3	13-12-2025		
3.	HTML Tables, Forms andFrames	3	20-12-2025		
4.	HTML Tables, Forms andFrames	3	27-12-2025		
5.	HTML 5 and Cascading StyleSheets, Types of CSS	3	03-01-2026		
6.	Selector forms	3	10-01-2026		
7.	CSS with Color, Background,Font, Text and CSS Box Model	3	24-01-2026		
8.	Introduction to Java script and how to embedded JS inhtml	3	07-02-2026		
9.	Applying JavaScript - internal and external, I/O, Type Conversion	3	14-02-2026		
10.	JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects	3	21-02-2026		
11.	JavaScript Functions and Events	3	28-02-2026		
12.	Node.js	3	07-03-2026		

13.	**Add-ON**: Database connectivity using NodeJS Project	3	14-03-2026		
15.	Internal Exam	3	28-03-2026		

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Day to Day Work:	15
Internal Test	15
Continuous Internal Assessment	30
Procedure	20
Execution & Results	30
Viva-voce	20
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineeringknowledge**: Applythe knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the publichealth and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineeringpractice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Applyethical principles and commit to professional ethics and responsibilities andnorms of the engineeringpractice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinarysettings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give andreceive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments.

PO 12	**Life-long learning**: Recognize theneed for, andhave the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Organize, Analyze and Interpret the data to extract meaningful conclusions
PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO 3	Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Mrs. K. Rajasree**	**Dr. S. Nagarjuna Reddy**	**Dr.Sk.Jameer**	**Dr. S. Jayaprada**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' Grade
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr Ch. Johnwesily
Course Name & Code : DESIGN THINKING & INNOVATION-23ME57
L-T-P Structure : 3-0-0 **Credits:** 02
Program/Sem/Sec : B.Tech./CSE(AI&ML)/IV/B **A.Y.:** 2025-26

Pre-requisites: None

Course Educational Objective (CEO): The main objectives of the course are to make students bring awareness on innovative design and new product development.

- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process.

Course Outcomes: At the end of the course, students will be able to

CO1. Define the concepts related to design thinking. **(Remember-L1)**
CO2. Explain the fundamentals of Design Thinking and innovation. **(Understand-L2)**
CO3. Apply the design thinking techniques for solving problems in various sectors. **(Apply-L3)**
CO4. Analyze to work in a multidisciplinary environment. **(Analyze-L4)**
CO5. Evaluate the value of creativity. **(Evalute-L5)**

Course Articulation Matrix (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	-	-	-	2	2	1	-
CO2	3	3	2	1	2	-	-	-	-	-	-	2	3	2	1
CO3	3	3	2	2	2	-	-	-	-	-	-	3	3	2	1
CO4	3	3	2	2	3	-	-	-	-	-	-	2	3	3	1
CO5	2	2	2	1	3	-	-	-	-	-	-	2	2	3	1
1-Low						**2 –Medium**							**3-High**		

Textbooks

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference Books

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e,Rockport Publishers, 2010.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: INTRODUCTION TO DESIGN THINKING

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to elements and principles of Design, Fundamental design components. **Activity:** To understand the importance of design	3	05-Dec-2025		TLM2 TLM5	
2.	Basics of design-dot, line, shape, form as fundamental design components **Activity:** Developing sketches using dot, line and form	3	12-Dec-2025		TLM2 TLM5	
3.	History of Design Thinking, New materials in Industry. **Activity:** To understand the importance of team work	3	19-Dec-2025		TLM2 TLM5	
No. of classes required to complete UNIT-I: 9				**No. of classes taken:**		

UNIT-II: DESIGN THINKING

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Process Design thinking process(empathize, analyze, idea &prototype) Design thinking process: Empathy. **Activity:** To understand the significance of Empathy	3	02-Jan-2026		TLM1	
2.	Design thinking process: Define or Analyze **Activity:** To understand the significance of Define/analyze	3	09-Jan-2026		TLM1	
3.	Design thinking process: Ideate, prototype **Activity:** To understand the significance of Ideate, Prototype	3	23-Jan-2026		TLM1	
4.	Tools of design thinking in social innovations **Activity:** Students should present their understanding of DTI elements using example	3	06-Feb-2026		TLM1	
I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)						
No. of classes required to complete UNIT-II: 12				**No. of classes taken:**		

UNIT-III: INNOVATION

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Art of innovation, Difference between innovation and creativity, Role of creativity and innovation in organizations. **Activity:** Debate on innovation and creativity ,Flow and planning from idea to innovation	3	13-Feb-2026		TLM2	
2.	teams for innovation, Measuring the impact and value of creativity. **Activity:** Debate on value-based innovation	3	20-Feb-2026		TLM2	
No. of classes required to complete UNIT-III: 6				**No. of classes taken:**		

UNIT-IV: PRODUCT DESIGN

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Problem formation, introduction to product design, Product strategies, Product value **Activity:** Importance of modeling, how to set specifications	3	06-Mar-2026		TLM2	
2.	Product planning, product specifications. Innovation towards product design Case studies. **Activity:** Explaining their ownproduct design.	3	27-Mar-2026		TLM2	
No. of classes required to complete UNIT-IV: 6				**No. of classes taken:**		

UNIT-V: DESIGN THINKING IN BUSINESS PROCESSES DESIGN

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly

1	Business & Strategic Innovation, Business challenges, Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes **Activity:** Marketing strategies of our own product, its maintenance, Reliability and plan for startup	3	02-Aprilr-2026			
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		
II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)						

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	**Marks**
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

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PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques.
PSO 2	Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies.
PSO 3	To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr Ch Johnwesily**	**Dr K. Devi Priya**	**Dr B. Srinivas Rao**	**Dr. S Jayaprada**
Signature				