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. SHAIK JAMEER
Course Name & Code : REINFORCEMENT LEARNING & 23AM09
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B. Tech/VII/A **A.Y.:** 2026-27

PREREQUISITES : **Basic knowledge of Artificial Intelligence and Machine Learning concepts, Fundamentals of Probability and Statistics**

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

- To introduce the fundamental concepts, principles, and framework of Reinforcement Learning and intelligent decision-making systems.
- To understand various reinforcement learning techniques including multi-armed bandits, Markov Decision Processes, Monte Carlo methods, and temporal learning approaches.
- To familiarize students with value functions, policy optimization, reward mechanisms, and agent–environment interactions for solving sequential decision problems.
- To provide knowledge of reinforcement learning algorithms and their implementation in real-world applications such as robotics, game playing, scheduling, automation, and intelligent control systems.

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

CO1	Understand the elements of Reinforcement Learning. **(Understand-L2)**
CO2	Apply Reinforcement Learning techniques to solve the n-armed Bandit problem. **(Apply-L3)**
CO3	Analyze and compare different Finite Markov Decision Processes based on their states, actions, transition probabilities, and reward mechanisms. **(Analyze-L4)**
CO4	Apply Monte Carlo Methods in solving real world problems. **(Apply-L3)**
CO5	Analyze the Applications and Case Studies of Reinforcement Learning. **(Analyze-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	2	2	1	-	-	-	-	-	-	-	-	1	1	-	2
CO2	3	2	2	2	2	-	-	-	-	-	-	2	2	2	-
CO3	3	3	2	2	2	-	-	-	-	-	-	2	2	2	2
CO4	2	2	-	2	2	-	-	-	-	-	-	2	2	2	-
CO5	2	2	2	2	2	-	-	-	-	-	-	2	2	2	2
1 - Low **2 –**Medium **3 -** High															

Text Books:

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement Learning- An Introduction",2nd Edition, The MIT Press,2018
2. Marco Wiering, Martijn van Otterlo Reinforcement Learning: State-of-the- Art (Adaptation, Learning, and Optimization (12))2012thEdition

Reference Books:

1. Vincent François-Lavet, Peter Henderson, Riashat Islam, An Introduction to Deep Reinforcement Learning (Foundations and Trends(r) in Machine Learning) , 2019

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: The Reinforcement Learning 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
1.	Introduction to Course and COs	1	29-06-2026		TLM1,2	
2.	Reinforcement Learning, Examples	2	30-06-2026 01-07-2026		TLM1,2	
3.	Elements of Reinforcement Learning	2	02-07-2026 04-07-2026		TLM1,2	
4.	Tutorial Class	1	06-07-2026		TLM3	
5.	Limitations and Scope	1	07-07-2026		TLM1,2	
6.	An Extended Example: Tic- Tac-Toe	2	08-07-2026 09-07-2026		TLM1,2	
7.	Summary	1	13-07-2026		TLM1,2	
8.	History of Reinforcement Learning	2	14-07-2026 15-07-2026		TLM1,2	
9.	Tutorial Class	1	16-07-2026		TLM1,2	
10.	**UNIT TEST-1**	1	18-07-2026		TLM5	
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT-II: Multi-arm Bandits

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.	An n-Armed Bandit Problem	1	20-07-2026		TLM1,2	
2.	Action-Value Methods	2	21-07-2026 22-07-2026		TLM1,2	
3.	Incremental Implementation	1	23-07-2026		TLM1,2	
4.	Tutorial Class	1	25-07-2026		TLM3	
5.	tracking a Nonstationary Problem	2	27-07-2026 28-07-2026		TLM1,2	
6.	Optimistic Initial Values	1	29-07-2026		TLM1,2	
7.	Upper-Confidence-Bound Action Selection	1	30-07-2026		TLM1,2, 6	
8.	Tutorial Class	1	01-08-2026		TLM3	
9.	Gradient Bandits	2	03-08-2026 04-08-2026		TLM1,2	
10.	Associative Search (Contextual Bandits).	2	05-08-2026 06-08-2026		TLM1,2, 6	
11.	Tutorial Class	1	10-08-2026		TLM3	
12.	**Unit Test-2**	1	11-08-2026		TLM5	
No. of classes required to complete UNIT-II: 16				**No. of classes taken:**		
MID-1(24.08.2026 to 29.08.2026)						

UNIT-III: Finite Markov Decision Processes

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.	The Agent–Environment Interface	2	12-08-2026 13-08-2026		TLM1,2	
2.	Goals and Rewards, Returns	2	17-08-2026 18-08-2026		TLM1,2	
3.	Unified Notation for Episodic and Continuing Tasks	2	19-08-2026 20-08-2026		TLM1,2	
4.	Tutorial Class	1	22-08-2026		TLM3	
5.	The Markov Property	1	31-08-2026		TLM1,2	
6.	Markov Decision Processes	2	01-09-2026 02-09-2026		TLM1,2, 6	
7.	Value Functions	1	03-09-2026		TLM1,2	
8.	Tutorial Class	1	05-09-2026			
9.	Optimal Value Functions	2	07-09-2026 08-09-2026		TLM1,2	
10.	Optimality and Approximation.	1	09-09-2026		TLM1,2, 6	
11.	**Unit Test-3**	1	10-09-2026		TLM5	
No. of classes required to complete UNIT-III: 16				**No. of classes taken:**		

UNIT-IV: Monte Carlo Methods

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.	Monte Carlo Prediction	1	15-09-2026		TLM1,2	
2.	Monte Carlo Estimation of Action Values	2	16-09-2026 17-09-2026		TLM1,2	
3.	Monte Carlo Control	1	19-09-2026		TLM1,2	
4.	Tutorial Class	1	21-09-2026		TLM3	
5.	Monte Carlo Control without Exploring Starts	2	22-09-2026 23-09-2026		TLM1,2	
6.	Off- policy Prediction via Importance Sampling	1	24-09-2026		TLM1,2	
7.	Incremental Implementation	1	26-09-2026		TLM1,2,6	
8.	Off-Policy Monte Carlo Control	1	28-09-2026		TLM1,2	
9.	Tutorial Class	1	29-09-2026		TLM3	
10.	Importance Sampling on Truncated Returns.	2	30-09-2026 01-10-2026		TLM1,2	
11.	**Unit Test-4**	1	03-10-2026		TLM5	
No. of classes required to complete UNIT-IV: 14				**No. of classes taken:**		

UNIT-V: Applications and Case Studies

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.	Applications	2	05-10-2026 06-10-2026		TLM1,2	
2.	Case Studies	2	07-10-2026 08-10-2026		TLM1,2	
3.	TD-Gammon	1	12-10-2026		TLM1,2	
4.	Samuel's Checkers Player	1	13-10-2026		TLM1,2	
5.	The Acrobot	1	14-10-2026		TLM1,2	
6.	Elevator Dispatching	1	15-10-2026		TLM1,2	
7.	Tutorial Class	1	17-10-2026		TLM3	
8.	Dynamic Channel Allocation	2	26-10-2026 27-10-2026		TLM1,2	
9.	Job-Shop Scheduling.	2	28-10-2026 29-10-2026		TLM1,2	
10.	**Unit Test-V**	1	31-10-2026		TLM5	
No. of classes required to complete UNIT-V: 14				**No. of classes taken:**		
MID-2 (02.11.2026 to 07.11.2026)						

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+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. Sk. 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. YARAMALA NAGAMANI
Course Name & Code : HUMAN RESOURCES & PROJECT MANAGEMENT (23HS03)
L-T-P Structure : **2-0-0** **Credits:** 2
Program/Sem/Sec : B.Tech/VII SEM /A SEC **A.Y.:** 2026-27
Regulations : R23

PREREQUISITE: Basic knowledge of management principles and organizational functions.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To explain the fundamentals of Human Resource Management and HR planning.
- To introduce training, development, performance appraisal, and career management.
- To discuss project management concepts, life cycle, and resource allocation.
- To compare project types and their unique management challenges.
- To apply project planning, implementation, control, and evaluation practices.

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

CO	Outcome	Bloom's Level
CO1	Explain fundamentals of HRM and HR planning	L2 – Understand
CO2	State training, development, and performance appraisal techniques	L1 – Remember
CO3	Interpret project management concepts and life cycle stages	L2 – Understand
CO4	Compare project types and their management challenges	L2 – Understand
CO5	Apply project planning, implementation, and evaluation techniques	L3 – Apply

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

COs / POs & PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	–	–	–	–	–	1	–	1	2	2	2	1	–	–	–
CO2	–	–	–	–	–	1	–	2	2	2	2	1	–	–	–
CO3	–	1	1	–	1	–	–	–	2	2	3	1	1	–	1
CO4	–	2	2	1	1	1	1	–	2	2	3	1	1	1	2
CO5	1	2	3	2	2	1	1	1	3	2	3	2	2	2	3

Scale: 1 – Low, 2 – Medium, 3 – High

TEXTBOOKS:

T1	Robert L. Mathis, John H. Jackson, Manas Ranjan Tripathy, *Human Resource Management*, Cengage Learning, 2016.
T2	Sharon Pande & Swapnalekha Basak, *Human Resource Management: Text and Cases*, Vikas Publishing, 2016.
T3	Stewart R. Clegg, Torgeir Skyttermoen, Anne Live Vaagaasar, *Project Management*, Sage Publications, 2021.
T4	K. Nagarajan, *Project Management*, New Age International Publishers, 2017.

REFERENCE BOOKS:

R1	Subba Rao P, *Personnel and Human Resource Management*, Himalaya Publications, 2013.
R2	K. Aswathappa, *Human Resource and Personnel Management*, Tata McGraw Hill, 2013.
R3	Prasanna Chandra, *Projects: Planning, Analysis, Selection, Financing, Implementation and Review*, Tata McGraw Hill, 1998.
R4	Vasanth Desai, *Project Management*, Himalaya Publications, 2018.
R5	Lalitha Balakrishnan & Gowri, *Project Management*, Himalaya Publishing House, 2022.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: HRM Fundamentals

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 HRM, Nature, Scope of HRM	1	2/07/26		TLM1, 2	
2.	Functions of HRM	1	03/07/26		TLM1, 2	
3.	Role of HR Manager, Emerging Trends	1	04/07/26		TLM1, 2	
4.	E-HRM, HR Audit Models	1	09/07/26		TLM1, 2	
5.	HR Planning	1	10/07/26		TLM1, 2	
6.	Demand & Supply Forecasting	1	11/07/26		TLM1, 2	
7.	Job Design	1	16/07/26		TLM1, 2	
8.	Recruitment Sources	1	17/07/26		TLM1, 2	
9.	Selection Procedures	1	18/07/26		TLM1, 2	
10.	Tutorial /Activity / Assignment	2	23/07/26		TLM 3/7	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: HRD & Performance Management

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.	HRD	1	24/07/26		TLM1,2	
12.	HR Accounting Models	1	25/07/26		TLM1,2	
13.	Training & Development Methods	2	01/08/26		TLM1,2	
14.	Performance Appraisal importance	1	06/08/26		TLM1,2	
15.	Performance Appraisal Methods	1	07/08/26		TLM1,2	
16.	Career Development	1	13/08/26		TLM1,2	
17.	Counseling and Group Interaction	1	14/08/26		TLM1,2	
18.	Counseling and Group Interaction intro, importance	1	20/8/26		TLM1,2	
19.	Counseling and Group Interaction advantages	1	21/8/26		TLM1,2	
20.	Tutorial /Activity / Assignment	2	21/08/26		TLM 3/7	
21.	MID EXAMS	24/08/26		29/8/26		
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III: Project Management Basics

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.	Concept of Resource Management	1	03/09/26		TLM1,2	
23.	Project Environment	1	05/09/26		TLM1,2	
24.	Types of Projects	1	10/09/26		TLM1,2	
25.	DPR and Project Networks	1	11/09/26		TLM1,2	
26.	Project Life Cycle,	1	12/09/26		TLM1,2	
27.	Project Proposals,	1	17/09/26		TLM1,2	
28.	Monitoring Progress	1	18/09/26		TLM1,2	
29.	Project Appraisal & Selection,	1	19/09/26		TLM1,2	
30.	Production Technology	1	24/9/26		TLM1,2	
31.	80-20 Rule,	1	25/9/26		TLM1,2	
32.	Communication Matrix	1	26/9/26		TLM1,2	

33.	Tutorial /Activity / Assignment	2	01/10/26		TLM 3/7	
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: Project Challenges

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
34.	Unique Management Challenges for Different Project Types	3	03/10/26		TLM1,2	
35.	Abandonment Analysis	1	08/10/26		TLM1,2	
36.	Tutorial /Activity / Assignment	3	09/10/26		TLM 3/7	
No. of classes required to complete UNIT-IV: 7				**No. of classes taken:**		

UNIT-V: Project Implementation & Review

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
37.	Forms of Project Organization	1	10/10/26		TLM1,2	
38.	Project Planning & Control	1	15/10/26		TLM1,2	
39.	Human Aspects of Project Management	1	16/10/26		TLM1,2	
40.	Prerequisites for Successful Implementation	1	17/10/26		TLM1,2	
41.	Project Review	1	29/10/26		TLM1,2	
42.	Performance Evaluation, Abandonment Analysis	1	30/10/26		TLM1,2	
43.	Tutorial / Activity / Assignment	1	31/10/26		TLM3/7	
44.	Revision	01	31/10/26		TLM2	
No. of classes required to complete UNIT-V: 8				**No. of classes taken:**		

Contents 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.	Project Appraisal & Selection,	19/9/26			**TLM 2,3**	

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 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.

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.

Mrs. Y NAGAMANI	Mrs. Y NAGAMANI	Dr. K DEEPIKA	Dr. K DEEPIKA
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: D. MANGAMMA

Course Name & Code **:** Blockchain Technology & 23CS16

L-T-P Structure **: 3-0-0** **Credits:** 3

Program/Sem/Sec : IV B.Tech., VII-Sem, A-Sec **A.Y.: 2026-27**

Prerequisites:

Course Objectives: The main objectives of the course is to

1.Learn the fundamentals of Blockchain and various types of blockchain and consensus mechanisms.

2. Understand public, private and consortium blockchain systems.

3. Identify the security issues of blockchain technology.

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

CO1	Explain the fundamentals of blockchain technology, blockchain architecture, consensus mechanisms, cryptocurrencies and blockchain systems. **(L2)**
CO2	Describe public, private and consortium blockchain systems, smart contracts and blockchain platforms**. (L2)**
CO3	Apply blockchain concepts in Bitcoin, Ethereum, Hyperledger, Ripple and Corda environments. **(L3)**
CO4	Apply security, privacy, scalability and regulatory concepts in blockchain systems**. (L3)**
CO5	Apply blockchain technology in banking, healthcare, supply chain, IoT, retail and financial services. **(L3)**

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

CO	Program Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	2	-	-	-	-	-	-	1	2	-	1
CO2	3	2	2	-	2	-	-	-	-	-	-	2	2	-	2
CO3	3	3	3	2	3	-	-	-	-	-	-	2	3	1	3
CO4	3	3	2	2	2	2	-	3	-	-	-	2	2	1	3
CO5	3	3	3	2	2	2	2	2	1	-	-	2	2	2	3
1-Low 2-Medium 3-High															

Textbooks:

1. Blockchain Technology – Chandramouli Subramanian, Asha A. George, Abhilash K. A., Meena Karthikeyan, Universities Press.

Reference Books:

1. Blockchain Blueprint for Economy – Melanie Swan, O'Reilly.
2. Blockchain for Business – Jai Singh Arun, Jerry Cuomo, Nitin Gaur, Pearson.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Fundamentals of Blockchain

S.No	Topics to be Covered	No. of Classes	Tentative Date	Actual Date	Teaching Learning Methods	HOD Sign
1	Introduction to Blockchain	2	29-06-2026 30-06-2026		TLM1	
2	Origin of Blockchain	1	01-07-2026		TLM1	
3	Blockchain Solution	1	02-07-2026		TLM1	
4	Components of Blockchain	1	04-07-2026		TLM1	
5	Block in a Blockchain	1	06-07-2026		TLM1	
6	Technology and Future	1	07-07-2026		TLM1	
7	Decentralization & Distribution	1	08-07-2026		TLM1	
8	Types of Blockchain	1	09-07-2026		TLM1	
9	Consensus Protocol	2	11-07-2026 13-07-2026		TLM1	
10	Bitcoin & Cryptocurrency	2	14-07-2026 15-07-2026		TLM2	
11	Cryptocurrency Basics	1	16-07-2026		TLM2	
12	Types of Cryptocurrencies	1	18-07-2026		TLM2	
13	Cryptocurrency Usage	2	20-07-2026 21-07-2026		TLM1	

No. of classes required to complete UNIT-I: 17

UNIT-II: Public Blockchain & Smart Contracts

S.No	Topics to be Covered	No. of Classes	Tentative Date	Actual Date	Teaching Learning Methods	HOD Sign
14	Introduction to Public Blockchain	1	22-07-2026		TLM1	
15	Popular Public Blockchains	1	23-07-2026		TLM1	
16	Bitcoin Blockchain	2	25-07-2026 27-07-2026		TLM1	
17	Ethereum Blockchain	2	28-07-2026 28-07-2026		TLM1	
18	Introduction to Smart Contracts	1	29-07-2026		TLM1	

19	Characteristics of Smart Contracts	1	30-07-2026		TLM2	
20	Types of Smart Contracts	2	01-08-2026 03-08-2026		TLM2	
21	Types of Oracles	2	04-08-2026 05-08-2026		TLM2	
22	Smart Contracts in Ethereum	2	06-08-2026 08-08-2026		TLM1	
23	Smart Contracts in Industry	2	10-08-2026 11-08-2026		TLM1	
24	TUTORIAL	2	12-08-2026 13-08-2026		TLM3	
I MID Examinations : 24-08-2026 To 29-08-2026						

No. of classes required to complete UNIT-II: 18

UNIT-III: Private & Consortium Blockchain

S.No	Topics to be Covered	No. of Classes	Tentative Date	Actual Date	Teaching Learning Methods	HOD Sign
24	Private Blockchain Introduction	1	17-08-2026		TLM1	
25	Characteristics of Private Blockchain	1	18-08-2026		TLM1	
26	Private Blockchain Examples	1	19-08-2026		TLM1	
27	Permissioned Blockchain Algorithms	1	20-08-2026		TLM1	
	UNIT II REVISION	1	21-08-2026		TLM1	
28	Byzantine Fault	1	31-08-2026		TLM2	
29	Multichain	1	01-09-2026		TLM2	
30	Consortium Blockchain	1	02-09-2026		TLM2	
31	Hyperledger Platform	2	03-09-2026 05-09-2026		TLM1	
32	Ripple	1	07-09-2026		TLM1	
33	Corda	2	08-09-2026 09-09-2026		TLM1	
34	Initial Coin Offering (ICO) TUTORIAL	2	10-09-2026 12-09-2026		TLM1/TLM3	

No. of classes required to complete UNIT-III: 15

UNIT-IV: Security & Applications

S.No	Topics to be Covered	No. of Classes	Tentative Date	Actual Date	Teaching Learning Methods	HOD Sign
35	Security in Blockchain	2	15-09-2026 16-09-2026		TLM1	
36	Security in Bitcoin	1	17-09-2026		TLM1	
37	Privacy Challenges	1	19-09-2026		TLM1	
38	Performance & Scalability	1	21-09-2026		TLM2	
39	Identity Management	1	22-09-2026		TLM2	
40	Regulatory Compliance	2	23-09-2026 24-09-2026		TLM1	
41	Hyperledger Security	1	26-09-2026		TLM1	
42	Blockchain Applications	2	28-09-2026 29-09-2026		TLM1	
43	Blockchain and IoT	1	30-09-2026		TLM1	
44	Limitations & Challenges TUTORIAL	2	01-10-2026 03-10-2026		TLM1/TLM3	

No. of classes required to complete **UNIT-IV: 14**

UNIT-V: Case Studies & Platforms

S.No	Topics to be Covered	No. of Classes	Tentative Date	Actual Date	Teaching Learning Methods	HOD Sign
45	Retail Case Study	2	05-10-2026 06-10-2026		TLM1	
46	Banking Case Study	1	07-10-2026		TLM1	
47	Healthcare Case Study	1	08-10-2026		TLM1	
48	Energy Case Study	2	10-10-2026 12-10-2026		TLM1	
49	Python for Blockchain	2	13-10-2026 14-10-2026		TLM1	
50	Hyperledger Fabric Components	2	15-10-2026 17-10-2026		TLM1	
51	Chaincodes	2	26-10-2026 27-10-2026		TLM1	
52	Fabric Java SDK Application	2	28-10-2026 29-10-2026		TLM1	
	TUTORIAL	1	31-10-2026		TLM3	
II MID EXAMINATIONS : 02-11-2026 To 07-11-2026						

No. of classes required to complete **UNIT-V: 15**

TOTAL CLASSES:17+18+15+14+15=**79**

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

EVALUATIONPROCESS(R23Regulation):

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 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.

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.CH.JOHN WESILY**	**Dr.K.V. PANDURANGA RAO**	**Dr. S. JAYAPRADA**
Signature				

PART-A

Name of Course Instructor: L.Narendra
Course Name & Code : BIGDATA ANALYTICS & 23AD09
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech/VI-VII-A **A.Y.:** 2026-27

PREREQUISITE: Should have knowledge of one Programming Language (Java preferably), Practice of SQL (queries and sub queries), exposure to Linux Environment.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

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

CO1	understand the Sets, Maps and Generic Classes to manage the Big Data. **(Understand-L2)**
CO2	understand the HDFS, building blocks of Hadoop and configure the Hadoop clusters to store a huge volume of data. **(Understand-L2)**
CO3	Illustrate the Map Reduce mechanism to process a huge volume of data. **(Apply-L3)**
CO4	Illustrate the Spark Streaming mechanism and RDD operations. **(Apply-L3)**
CO5	Implement a high-level data processing and data warehouse for a huge volume of data by using Pig and Hive tools. **(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	3	1	-	-	**1**	-	-	-	-	-	-	2	-	-	-
CO2	2	-	2	-	**2**	-	-	-	-	-	-	2	**1**	-	-
CO3	2	-	2	-	**2**	-	-	-	-	-	-	2	**2**	-	-
CO4	2	3	-	-	**2**	-	-	-	-	-	-	2	**2**	-	-
CO5	2	3	-	-	**2**	-	-	-	-	-	-	2	-	-	-
1 - Low					**2 –**Medium							**3 -** High			

TEXTBOOKS:

T1 Wiley & Big Java 4th Edition, Cay Horstmann, Wiley John Sons, INC
T2 Hadoop: The Definitive Guide by Tom White, 3 rd. Edition, O'reilly

REFERENCE BOOKS:

R1 Hadoop in Action by Chuck Lam, MANNING Publ
R2 Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss
R3 Hadoop in Practice by Alex Holmes, MANNING Publ
R4 Big Data Analytics by Dr. A.Krishna Mohan and Dr.E.Laxmi Lydia

Software Links:

1. Hadoop: http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Data structures in java

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 Big Data, CEOs and Cos discussion	1	30-06-2026		TLM1	
2.	Data Structures in Java: Linked Lists	1	01-07-2026		TLM1	
3.	Stacks	1	02-07-2026		TLM1	
4.	Queues	1	03-07-2026		TLM1	
5.	Sets	1	04-07-2026		TLM1	
6.	Maps	1	07-07-2026		TLM1	
7.	Generics: Generic Classes	1	08-07-2026		TLM1	
8.	Type Parameters	1	09-07-2026		TLM1	
9.	Implementing Generic Types	1	10-07-2026		TLM1	
10.	Generic Methods	1	11-07-2026		TLM1	
11.	Generic Methods	1	14-07-2026		TLM1	
12.	Wrapper Classes	1	15-07-2026		TLM1	
13.	Wrapper Classes	1	16-07-2026		TLM1	
14.	Concept of serialization	1	17-07-2026		TLM1	
15.	Case Study	1	18-07-2026		TLM3	
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: working with big data

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	Working with big data	1	21-07-2026		TLM1/2	
17.	Google file system	1	22-07-2026		TLM1/2	
18.	Hadoop Distributed File System	1	23-07-2026		TLM1/2	
19.	Building blocks of Hadoop	1	24-07-2026		TLM1/2	
20.	Name node	1	25-07-2026		TLM1/2	
21.	Data node	1	28-07-2026		TLM1/2	
22.	Secondary name node	1	29-07-2026		TLM1/2	
23.	Job tracker	1	30-07-2026		TLM1/2	
24.	Task tracker	1	31-07-2026		TLM1/2	
25.	Configuring Hadoop clusters	1	01-08-2026		TLM1/2	
26.	Configuring XML files	1	04-08-2026		TLM1/2	
27.	Read operation	1	05-08-2026		TLM1/2	
28.	Write operation	1	06-08-2026		TLM1/2	
29.	HDFS commands	1	07-08-2026		TLM1/2	
30.	HDFS commands	1	08-08-2026		TLM1/2	
31.	HDFS commands	1	11-08-2026		TLM1/2	
32.	HDFS commands	1	12-08-2026		TLM1/2	
33.	HDFS commands	1	13-08-2026		TLM1/2	
34.	HDFS commands	1	14-08-2026		TLM1/2	
35.	HDFS commands	1	18-08-2026		TLM1/2	
36.	HDFS commands	1	19-08-2026		TLM1/2	
37.	HDFS commands	1	20-08-2026		TLM1/2	
38.	HDFS commands	1	21-08-2026		TLM1/2	
39.	Case Study	1	22-08-2026		TLM3	
No. of classes required to complete UNIT-II: 24				**No. of classes taken:**		

UNIT-III: Writing Map Reduce Programs

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
40.	A weather dataset	1	01-09-2026		TLM1/2	
41.	Understanding Hadoop API for MR	1	02-09-2026		TLM1/2	
42.	Old API	1	03-09-2026		TLM1/2	
43.	New API	1	05-09-2026		TLM1/2	
44.	Basic Map Reduce programs	1	08-09-2026		TLM1/2	
45.	Driver code	1	09-09-2026		TLM1/2	
46.	Mapper code	1	10-09-2026		TLM1/2	
47.	Reducer code	1	11-09-2026		TLM1/2	
48.	Record Reader	1	12-09-2026		TLM1/2	
49.	Combiner	1	15-09-2026		TLM1/2	
50.	Partitioner	1	16-09-2026		TLM1/2	
51.	YARN	1	17-09-2026		TLM1/2	
52.	Use case of Map Reduce	1	18-09-2026		TLM1/2	
53.	Case Study	1	19-09-2026		TLM3	
No. of classes required to complete UNIT-III: 14				**No. of classes taken:**		

UNIT-IV: Stream Memory and Spark

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
54.	Introduction to Stream concepts	1	22-09-2026		TLM1/2	
55.	Stream data model and architecture	1	23-09-2026		TLM1/2	
56.	Stream computing, Sampling Data in a Stream	1	24-09-2026		TLM1/2	
57.	Filtering Streams	1	25-09-2026		TLM1/2	
58.	Counting Distinct Elements in a Stream	1	26-09-2026		TLM1/2	
59.	Introduction to Spark Concept	1	29-09-2026		TLM1/2	
60.	Spark Architecture and components	1	30-09-2026		TLM1/2	
61.	Spark installation	1	01-10-2026		TLM1/2	
62.	Spark RDD(Resilient Distributed Dataset)	1	03-10-2026		TLM1/2	
63.	Spark RDD operations.	1	06-10-2026		TLM1/2	
64.	Spark RDD operations.	1	07-10-2026		TLM1/2	
65.	Case study	1	08-10-2026		TLM3	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Pig & Applying Structure to Hadoop Data with Hive

S. No.	Topics to be covered	No. of	Tentative	Actual	Teaching	HOD

		Classes Required	Date of Completion	Date of Completion	Learning Methods	Sign Weekly
66.	Hadoop Programming Made Easier: Admiring the Pig Architecture	1	09-10-2026		TLM1/2	
67.	going with the Pig Latin Application Flow	1	10-10-2026		TLM1/2	
68.	working through the ABCs of Pig Latin	1	13-10-2026		TLM1/2	
69.	Evaluating Local and Distributed Modes of Running Pig Scripts	1	14-10-2026		TLM1/2	
70.	Checking out the Pig Script Interfaces	1	15-10-2026		TLM1/2	
71.	Scripting with Pig Latin.	1	16-10-2026		TLM1/2	
72.	Saying Hello to Hive, Seeing How the Hive is Put Together,	1	17-10-2026		TLM1/2	
73.	Getting Started with Apache Hive	1	27-10-2026		TLM1/2	
74.	Examining the Hive Clients, Working with Hive Data Types	1	28-10-2026		TLM1/2	
75.	Creating and Managing Databases and Tables	1	29-10-2026		TLM1/2	
76.	Seeing How the Hive Data Manipulation Language Works	1	30-10-2026		TLM1/2	
77.	Querying and Analyzing data	1	31-10-2026		TLM3	
No. of classes required to complete UNIT-V: 12				**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.	BDA Use case – I	1	30-10-2026		TLM2	
2.	BDA Use case – II	1	31-10-2026		TLM2	
				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

Internal Mid Examinations Dates	
I-MID Examinations	24-08-2026 to 29-08-2026
II-MID Examinations	02-11-2026 to 07-11-2026

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

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	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.L.Narendra**	**Mr.L.Narendra**	**Dr.K.V.Panduranga Rao**	**Dr. S. Jayaprada**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC, NBA(TIER-I) & ISO 9001:2015 Certified Institution
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L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor	: B Rama Krishna	
Course Name & Code	: ENVIRONMENTAL SANITATION & 23CE83	
L-T-P Structure	: 3-0-0	Credits : 3
Program/Sem/Sec	: B.Tech., VII-Sem., CSM-A	A.Y : 2026-27

PRE-REQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course teaches the basic terminology of Environmental sanitation, different methods for control of Communicable and non-communicable diseases, the control techniques for rodent and vectors, sanitation measures that are required in few Institutions, sanitation management aspects due to rural and refuse wastes.

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

CO 1	Explain the basic terminology of Environmental sanitation, different diseases, rural and refuse sanitation (Understand-L2)
CO 2	Identify the impacts and ways to control Communicable and non-communicable diseases (Understand-L2)
CO 3	Review and assess the control approaches for rodent and insect vectors (Understand-L2)
CO 4	Classify the appropriate sanitation measures for several institutions (Understand-L2)
CO 5	Select the appropriate measures to be taken for rural and refuse management (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	2	-	-	-	-	1	1	-	-	-	-	1	1	-	1
CO2	2	-	-	-	-	1	1	-	-	-	-	1	1	-	1
CO3	2	-	-	-	-	1	1	-	-	-	-	1	1	-	1
CO4	2	-	-	-	-	1	1	-	-	-	-	1	1	-	1
CO5	3	-	-	-	-	1	1	-	-	-	-	1	1	-	1

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

TEXT BOOKS:

T1 Joseph. A. Salvato, Nelson N. Nemerow, Frankiln J. Agardy, "Environmental Engineering", John Wiley & Sons, 5th Edition, 2003.

T2 I.M. Prahlad Edited, "Environmental Sanitation - Reflections from Practice, A Module for Community Health Practitioners", Society For Community Health Awareness Research and Action, 2015.

REFERENCE BOOKS:

R1 S.K. Garg, "Sewage Disposal and Air pollution engineering", Khanna Publishers, New Delhi, 2009.

R2 K.V.S.G. Muralikrishna, "Environmental Sanitation", Reem Publications, Kakinada, 2003.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT –I: ENVIRONMENTAL SANITATION BASICS

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.	CO's and PO's	1	29-06-2026		**TLM2**	
2.	Introduction of sanitation practices	1	30-06-2026		**TLM2**	
3.	History sanitation practices	1	02-07-2026		**TLM2**	
4.	Evolution of sanitation practices	1	04-07-2026		**TLM2**	
5.	Role of Sanitary Engineer	1	06-07-2026		**TLM2**	
6.	Sanitation management aspects for liquid wastes	1	07-07-2026		**TLM2**	
7.	Sanitation management aspects for solid wastes	1	09-07-2026		**TLM2**	
8.	Basic Definitions	1	11-07-2026		**TLM2**	
9.	Types of diseases- Communicable diseases	1	13-07-2026		**TLM2**	
10.	Non-communicable diseases	1	14-07-2026		**TLM2**	
11.	Water borne diseases	1	16-07-2026		**TLM2**	
12.	Mortality rates	1	18-07-2026		**TLM2**	
No. of classes required to complete UNIT-I:12				No. of classes taken:		

UNIT-II: CONTROL OF COMMUNICABLE AND NON-COMMUNICABLE DISEASES

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.	**Communicable Diseases:** Impacts,	1	20-07-2026		**TLM2**	
2.	Control of Source (Agent Factors)	1	21-07-2026		**TLM2**	
3.	Control of Mode of Transmission Factor (Environmental Factors)	1	23-07-2026		**TLM2**	
4.	Control of Mode of Transmission Factor (Environmental Factors)	1	25-07-2026		**TLM2**	
5.	Control of Susceptibles (Host Factors)	1	27-07-2026		**TLM2**	
6.	Epidemic Control	1	28-07-2026		**TLM2**	
7.	Respiratory Diseases- Types, Impacts, Characteristics	1	30-07-2026		**TLM2**	
8.	Respiratory Diseases- Control	1	01-08-2026		**TLM2**	
9.	Water borne Diseases- Types, Impacts, Characteristics	1	03-08-2026		**TLM2**	
10.	Water borne Diseases- Control	1	04-08-2026		**TLM2**	

11.	Food borne Diseases-Types, Impacts, Characteristics	1	06-08-2026		**TLM2**	
12.	Food borne Diseases-Control	1	08-08-2026		**TLM2**	
No. of classes required to complete UNIT-II:12				No. of classes taken:		

UNIT-III: INSECT VECTOR AND RODENT 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
1.	Mosquitoes as carriers of diseases	1	10-08-2026		**TLM2**	
2.	Mosquito control	1	11-08-2026		**TLM2**	
3.	Larvae control	1	13-08-2026		**TLM2**	
4.	Adult control	1	17-08-2026		**TLM2**	
5.	Man-made mosquito breeding centres	1	18-08-2026		**TLM2**	
6.	Outdoor control of mosquitoes	1	20-08-2026		**TLM2**	
7.	Housefly as disease carrier	1	22-08-2026		**TLM2**	
8.	Fly control	1	31-08-2026		**TLM2**	
9.	Rodent control	1	01-09-2026		**TLM2**	
10.	Control Diseases transmitted from Animals.	1	03-09-2026		**TLM2**	
No. of classes required to complete UNIT-III:10				No. of classes taken:		

UNIT- IV: INSTITUTIONAL SANITATION

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.	Sanitation measures in hotels	1	05-09-2026		**TLM2**	
2.	Sanitation measures in Restaurants	1	07-09-2026		**TLM2**	
3.	Sanitation measures in public bathing ghats	1	08-09-2026		**TLM2**	
4.	Sanitation measures in Schools	1	10-09-2026		**TLM2**	
5.	Sanitation measures in Schools	1	12-09-2026		**TLM2**	
6.	Sanitation measures in Hospitals	1	15-09-2026		**TLM2**	
7.	Sanitation measures in Hospitals	1	17-09-2026		**TLM2**	
8.	Sanitation measures in Swimming pools	1	19-09-2026		**TLM2**	
9.	Sanitation measures in Swimming pools	1	21-09-2026		**TLM2**	
10.	Sanitation measures in Prisons.	1	22-09-2026		**TLM2**	
11.	Revision	1	24-09-2026		**TLM2**	
12.	Revision	1	26-09-2026		**TLM2**	
No. of classes required to complete UNIT-IV:10				No. of classes taken:		

UNIT-V : RURAL AND REFUSE SANITATION

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.	**Rural sanitation**: Aqua privy, Septic tank, Soak pit and sulabh mode of sanitation	1	28-09-2026		**TLM2**	
2.	**Rural sanitation**: Appropriate low-cost rural sanitation techniques	1	29-09-2026		**TLM2**	
3.	**Rural sanitation**: Biogas generation from toilet	1	01-10-2026		**TLM2**	
4.	**Refuse Sanitation:** Municipal garbage – sources, generation and collection	1	03-10-2026		**TLM2**	
5.	**Refuse Sanitation:** Municipal garbage – recovery and disposal options	1	05-10-2026		**TLM2**	
6.	**Refuse Sanitation:** Sanitation problems with regard to: Dumping and sanitary landfilling	1	06-10-2026		**TLM2**	
7.	**Refuse Sanitation:** Sanitation problems with regard to: Mass firing of waste and incineration	1	08-10-2026		**TLM2**	
8.	**Refuse Sanitation:** Mosquito breeding, Leachate, Management issues	1	10-10-2026		**TLM2**	
9.	**Ecological Sanitation:** Principle, Eco-sanitation as a sustainable approach	1	12-10-2026		**TLM2**	
10.	**Occupational health hazards:** Concept, Types, Safety aspects of sanitation workers	1	13-10-2026		**TLM2**	
11.	**Revision**	1	15-10-2026 17-10-2026		**TLM2**	
12	**Revision For mid-2**	1	26-10-2026 to 31-10-2026		**TLM2**	
No. of classes required to complete UNIT-V:10				No. of classes taken:		

Teaching Learning Methods					
TLM1	Chalk and Talk	**TLM4**	Problem Solving	**TLM7**	Seminars or GD
TLM2	PPT	**TLM5**	Programming	**TLM8**	Lab Demo
TLM3	Tutorial	**TLM6**	Assignment or Quiz	**TLM9**	Case Study

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 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	**B Rama Krishna**	**B. Ramakrishna**	**J Rangaiah**	**Dr. K V Ramana**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

PROGRAM: B.Tech. VII-Sem. (A Section) **ACADEMIC YEAR:** 2026-27
COURSE NAME & CODE: Prompt Engineering (23AMS1). **L-T-P:** 0-1-2
COURSE CREDITS: 2
COURSE INSTRUCTOR: Dr. K. V. Panduranga Rao

PRE-REQUISITE: Linear Algebra, Python Programming

Course Educational Objective:

The main objectives of the course are to

- Apply iterative prompting for clarity and context.
- Create varied prompts to steer model outputs.
- Construct a chain of thought and structured prompts.
- Develop retrieval-augmented pipelines to ground outputs.
- Evaluate LLM agents and multimodal apps for ethics and robustness.

Course Outcomes (CO): At the end of this course, the student will be able to:

- **CO1:** Understand the fundamental principles, techniques, and design patterns of effective prompt engineering.
- **CO2:** Apply prompt engineering techniques (e.g., zero-shot, few-shot, chain-of-thought) to enhance model performance.
- **CO3:** Utilize Large Language Models (LLMs) to generate text, images, and code for creative and practical applications.
- **CO4:** Evaluate LLM outputs using metrics like accuracy and relevance, and refine prompts to minimize hallucinations and bias.
- **CO5:** Implement ethical, safe, and secure prompting strategies to comply with data privacy and legal standards.

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

CO / PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	1	-	-	-	-	1	-	1	1	1	1
CO2	2	3	3	1	3	-	-	-	-	-	-	1	2	2	2
CO3	1	2	3	2	3	-	-	-	-	2	-	1	3	2	3
CO4	2	3	2	3	2	-	-	2	-	-	-	1	2	3	2
CO5	1	1	2	-	1	3	-	3	-	-	-	3	1	1	3

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

PROMPT ENGINEERING (LESSON PLAN)

Expt. No	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Environment & Connectivity: Install required packages (e.g., transformers, OpenAI); securely configure the API key; run a simple "Hello, world" prompt to verify model access. Baseline vs. Enhanced Prompts: Execute a naïve prompt ("Write a one-paragraph bio of Ada Lovelace.") and an enhanced prompt that adds role framing, specificity, and explicit format instructions; compare both outputs for relevance, completeness, and style.	3	29/06/2026		TLM8 TLM5	
2	Definition of prompt engineering, Distinction between prompt engineering and model fine-tuning, Motivation and benefits of prompt engineering,	1	02/07/2026		TLM8 TLM2	
3	Iterative Refinement on a Simple Task: Summarize the plot of the Shakespearean play Romeo and Juliet in two sentences through three rounds of prompt tweaking: a. Minimal instruction. b. Addition of length and style constraints c. Specification of key content elements (setting and theme) Document how each iteration changes and improves the result. Diagnosing Prompt Failures & Edge Cases: Craft a vague or contradictory prompt; analyze the failure mode (ambiguity, missing context, or format errors); refine the prompt by adding examples or clarifying instructions.	3	06/07/2026		TLM8 TLM5	
4	Core principles of effective prompt design, Anatomy of a prompt, Setting up the Python environment for LLM interaction, Iterative prompting lifecycle, Common prompt pitfalls and remediation	1	09/07/2026		TLM8 TLM2	

5	Few-Shot vs. Zero-Shot Comparison: Design and execute a zero-shot prompt and a few-shot prompt (with 2–3 exemplar input-output pairs) for a chosen text task (e.g., sentiment classification or translation); compare outputs for accuracy, consistency, and adherence to examples.	3	13/07/2026		TLM8 TLM5	
6	Enhanced prompt anatomy: contextual detail and explicit output specifications, Few-shot in-context prompting, Prompt structuring and template design,	1	16/07/2026		TLM8 TLM2	
7	Role-Based & Negative Prompting: Craft a role-based prompt to establish a specific persona (e.g., "You are a financial advisor…"); then create a negative prompt to suppress undesired content (e.g., "Do not mention any brand names"); evaluate how each influences the model's response.	3	20/07/2026		TLM8 TLM5	
8	Role-based prompting to establish personas or system behavior, Negative prompting to filter or suppress undesired content,	1	23/07/2026		TLM8 TLM2	
9	Constraint Specification & Iterative Refinement: Select an open-ended task (e.g., summarizing a technical article); issue a basic prompt; identify failures in length or format; refine the prompt by adding explicit constraints (word count, bullet format, etc.); document improvements over two refinement cycles.	3	27/07/2026		TLM8 TLM5	
10	Constraint specification and instruction enforcement (e.g., length, format), Iterative prompt refinement and optimization	1	30/07/2026		TLM8 TLM2	
11	Structured Format Prompting: Instruct the model to output information as bullet lists and Markdown tables (e.g., "List three benefits of daily exercise in a Markdown table with columns 'Benefit' and 'Description.'"); verify the output matches the requested structure.	3	03/08/2026		TLM8 TLM5	
12	Importance of structured outputs for real-world applications, Prompting for specific formats (lists, tables, Markdown),	1	06/08/2026		TLM8 TLM2	
13	JSON/YAML Generation: Provide a brief dataset description (e.g.,	3	10/08/2026		TLM8 TLM5	

	three books with title, author, publication year) and prompt the model to produce valid JSON or YAML; use a parser to validate syntax and refine the prompt if errors occur.					
14	Generating valid JSON and YAML via explicit instructions	1	13/08/2026		TLM8 TLM2	
15	Chain-of-Thought & Task Decomposition: Present a multi-step problem (e.g., a logic puzzle) and apply zero-shot CoT prompting (e.g., "Let's think step by step. Explain your reasoning before the final answer."); separately, decompose the problem into sequential sub-questions, collect partial answers, combine them, and compare accuracy against a direct-answer baseline.	3	17/08/2026		TLM8 TLM5	
16	Eliciting chain-of-thought reasoning in zero-shot prompts, Decomposing complex tasks into manageable sub-tasks	1	20/08/2026		TLM8 TLM2	
17	Building a Simple LCEL Chain: Create a minimal LCEL script that accepts a fixed instruction (e.g., "Summarize this text: …"), passes it to an LLM, and prints the result; verify end-to-end execution.	3	31/08/2026		TLM8 TLM5	
18	Limitations of LLM internal knowledge, Need for external data sources, Introduction to Retrieval Augmented Generation (RAG)	1	03/09/2026		TLM8 TLM2	
19	Basic Data Indexing for RAG: Load a small collection of documents; split into uniform chunks (e.g., 200 tokens); generate embeddings for each chunk; store them in an in memory vector store; inspect for consistency.	3	07/09/2026		TLM8 TLM5	
20	Overview of RAG architecture (indexing vs. retrieval + generation), Getting started with LangChain for LLM applications,	1	10/09/2026		TLM8 TLM2	
21	Constructing & Running a Basic RAG Chain: Build a pipeline that: a. Receives a user query b. Retrieves the top-k relevant chunks c. Constructs a combined prompt with context + query d. Send it to the LLM e. Returns the answer	3	14/09/2026		TLM8 TLM5	
22	Basics of LangChain Expression Language (LCEL), Simplified indexing pipeline: document loading & text splitting	1	17/09/2026		TLM8 TLM2	

23	Constructing & Running a Basic RAG Chain: Build a pipeline that: a. Receives a user query b. Retrieves the top-k relevant chunks c. Constructs a combined prompt with context + query d. Send it to the LLM e. Returns the answer	3	21/09/2026		TLM8 TLM5	
24	Fundamentals of embeddings and vector stores, Building a basic retrieval generation pipeline with an LCEL chain	1	24/09/2026		TLM8 TLM2	
25	Building a Simple LLM Agent: Register a tool (e.g., a calculator function) and craft prompts that instruct the agent to invoke it when required; implement using LangChain or a function-calling API; test on queries requiring tool execution.	3	28/09/2026		TLM8 TLM5	
26	Introduction to LLM agents and their basic architecture, Overview of multimodal AI models (VLMs),	1	01/10/2026		TLM8 TLM2	
27	Building a Simple LLM Agent: Register a tool (e.g., a calculator function) and craft prompts that instruct the agent to invoke it when required; implement using LangChain or a function-calling API; test on queries requiring tool execution.	3	05/10/2026		TLM8 TLM5	
28	Prompting for text-to image generation and image understanding, Importance of prompt evaluation beyond subjective judgment	1	08/10/2026		TLM8 TLM2	
29	Multimodal Prompting Exploration: Generate images from detailed text prompts; feed one generated image into an image-understanding model or API with an appropriate prompt; compare the returned caption to the original prompt to evaluate alignment.	3	12/10/2026		TLM8 TLM5	
30	Manual evaluation techniques (heuristic checks for accuracy, relevance, format), Introduction to "LLM-as-Judge" for automated evaluation, Security considerations (prompt injection, sensitive-information risks)	1	15/10/2026		TLM8 TLM2	
31	Prompt Evaluation & Ethics Workshop: a. Select two existing prompts and generate multiple outputs; apply manual heuristic checks for accuracy, relevance, and format compliance. b. Use an	3	26/10/2026		TLM8 TLM5	

	"LLM-as-Judge" prompt (e.g., "Rate these outputs on a scale of 1–5 for clarity and correctness.") to automate evaluation. c. Design a prompt- injection test (e.g., "Ignore previous instructions…"), observe the response, then refine system prompts to mitigate the vulnerability.					
32	Prompt-based mitigation strategies for safety and robustness, Ethical concerns (bias, misinformation, data privacy) ,Brief exploration of UI frameworks (Streamlit/Gradio) for deploying prompt-driven apps, Adapting to the evolving nature of prompt engineering through continuous learning	1	29/10/2026		TLM8 TLM2	

Teaching Learning Methods					
TLM1	Chalk and Talk	**TLM4**	Problem Solving	**TLM7**	Seminars or GD
TLM2	PPT	**TLM5**	Programming	**TLM8**	Lab Demo
TLM3	Tutorial	**TLM6**	Assignment or Quiz	**TLM9**	Case Study

PART-C

EVALUATION PROCESS (R23 Regulations):

According to the Academic Regulations of R23, the 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 a 3-hour duration and evaluated for 70 marks. The performance of the student shall be evaluated as per the parameters indicated below:

Parameter	**Marks**
Procedure/Algorithm	20
Experimentation/Program execution	30
Observations/Calculations/Validation	
Result/Inference	
Viva voce	20
Total	70

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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. K.V. Panduranga Rao	**Dr. K.V. Panduranga Rao**	**Dr. SK. Salma Asiya Begam**	**Dr. S. Jayaprada**

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING(AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: V.SAI PRASANNA
Course Name & Code : Constitution Of India 23MC05
L-T-P Structure : 2 0 0 **Credits:** 2
Program-Sem-Sec : IV B.Tech., VII-Sem, A-Sec **A.Y.: 2026-27**

Prerequisites:

Course Objectives: The main objectives of the course is to

- To make students understand the historical background and philosophy of the Indian Constitution.
- To make students acquire knowledge of Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties.
- To make students understand the structure, powers, and functions of the Legislature, Executive, and Judiciary.
- To make students analyze the role and functioning of local self-government institutions and grassroots democracy.
- To make students understand the role of the Election Commission and constitutional bodies for the welfare of marginalized sections.

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

CO1	Explain the history, philosophy, and salient features of the Indian Constitution. **(Understand-L2)**
CO2	Describe Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties. **(Understand-L2)**
CO3	List the powers and functions of the Legislature, Executive, and Judiciary. **(Remembering L1)**
CO4	Interpret the structure and functioning of local administration and Panchayati Raj institutions. **(Understand-L2)**
CO5	Explain the role of the Election Commission and welfare institutions for SC-ST-OBC and women. **(Understand-L2)**

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

CO	Program Outcomes (PO ' S)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	2	3	-	2	-	2	-	3	3
CO2	-	-	-	-	-	3	2	3	-	2	-	2	-	3	3
CO3	-	-	-	-	-	3	-	2	-	2	-	1	3	2	-
CO4	-	-	-	-	-	3	2	2	-	2	-	1	1	3	-
CO5	-	-	-	-	-	3	-	2	-	2	-	1	-	3	2

Textbooks:

1. The Constitution of India, 1st Edition, (Bare Act), Government Publication, 1950
2. Framing of Indian Constitution, 1st Edition, Dr. S. N. Busi, Dr. B. R. Ambedkar 2015

Reference Books:

Indian Constitution Law, 7th Edition, M. P. Jain, Lexis Nexis, 2014.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: History of Making of the Indian Constitution

S.No	Topics to be Covered	No. of Classes	Tentative Date	Actual Date	Teaching Learning Methods	HOD Sign
1.	History	1	1-7-26		TLM1/2	
2.	Drafting Committee	1	3-7-26		TLM1/2	
3.	Composition & Working	1	8-7-26		TLM1/2	
4.	Philosophy of the Indian Constitution	1	10-7-26		TLM1/2	
5.	Preamble	1	15-7-26		TLM1/2	
6.	SalientFeatures	1	17-7-26		TLM1/2	

UNIT-II: Contours of Constitutional Rights & Duties

S.No	Topics to be Covered	No. of Classes	Tentative Date	Actual Date	Teaching Learning Methods	HOD Sign
7.	Fundamental Rights, ,	1	22-7-26		TLM1/2	
8.	Right to Equality	1	24-7-26		TLM1/2	
9.	Right to Freedom	1	29-7-26		TLM1/2	
10.	Right against Exploitation	1	31-7-26		TLM1/2	

11.	Right to Freedom of Religion ,Cultural and EducationalRights	1	5-8-26		TLM1/2	
12.	Right to Constitutional Remedies	1	7-8-26		TLM1/2	
13.	Directive Principles of State Policy	1	12-8-26		TLM1/2	
14.	Fundamental Duties.	1	14-8-26		TLM1/2	
No. of classes required to complete **UNIT-II: 8**				**No. of classes taken:**		

UNIT-III: Organs of Governance

S.No	**Topics to be Covered**	**No. of Classes**	**Tentative Date**	**Actual Date**	**Teaching Learning Methods**	**HOD Sign**
15.	Parliament Composition	1	19-8-26		TLM1/2	
16.	Qualifications and Disqualifications	1	21-8-26		TLM1/2	
17.	Powers and Functions	1	2-9-26		TLM1/2	
18.	Executive- President, Governor,	1	2-9-26		TLM1/2	
19.	Council of Ministers, Judiciary	1	9-9-26		TLM1/2	
20.	Appointment and Transfer of Judges	1	11-9-26		TLM1/2	
21.	Qualifications, Powers and Functions	1	16-9-26		TLM1/2	
No. of classes required to complete UNIT-III: 7				**No. of classes taken**		

UNIT-IV: Local Administration

S.No	**Topics to be Covered**	**No. of Classes**	**Tentative Date**	**Actual Date**	**Teaching Learning Methods**	**HOD Sign**
22.	District's Administration head: Role and Importance,	1	18-9-26		TLM1/2	
23.	Municipalities: Introduction	1	23-9-26		TLM1/2	

24.	Mayor and role of Elected Representative CEO of Municipal Corporation	1	23-9-26		TLM1/2	
25.	Panchayati raj: Introduction	1	25-9-26		TLM1/2	
26.	PRI: Zila Panchayat, Elected officials and their 176 roles	1	30-9-26		TLM1/2	
27.	CEO ZilaPachayat: Position and role	1	7-10-26		TLM1/2	
28.	Block level: Organizational Hierarchy (Different departments)	1	9-10-26		TLM1/2	
29.	Village level: Role of Elected and Appointed officials	1	14-10-26		TLM1/2	
30.	Importance of grass root democracy	1	16-10-26		TLM1/2	
No. of classes required to complete UNIT-IV: 9				**No. of classes taken**		

UNIT-V: Election Commission

S.No	**Topics to be Covered**	**No. of Classes**	**Tentative Date**	**Actual Date**	**Teaching Learning Methods**	**HOD Sign**
31.	Election Commission	1	16-10-26		TLM1/2	
32.	Role and Functioning, Chief Election Commissioner and Election Commissioners,	1	28-10-26		TLM1/2	
33.	State Election Commission	1	28-10-26		TLM1/2	
34.	Role and Functioning	1	30-10-26		TLM1/2	

35.	Institute and Bodies for the welfare of SC-ST-OBC and women	1	30-10-26		TLM1/2	
No. of classes required to complete UNIT-V: 5				**No. of classes taken**		

TOTAL CLASSES:6+8+7+9+5=**35**

Teaching Learning Methods			
TLM1/2	Chalk and Talk	**TLM4**	Demonstration (Lab-Field Visit)
TLM1/2	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

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	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	Ms.V.SAI PRASANNA	Dr.Ch.RAJENDRA BABU		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)

COURSEHANDOUT

PART-A

Name of Course Instructor : **Dr Johnwesily Chappidi**
Course Name & Code : **Block Chain Technology** & **23CS16**
L-T-P Structure : 3-0-0 **Credits:**3
Program/Sem/Sec : B.Tech/ VII/B **A.Y.:**2026-2027

PREREQUISITE: Data Structures, Data Mining.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this course is

- Learn the fundamentals of Block Chain and various types of block chain and consensus mechanism.
- Understand public block chain system, Private block chain system and consortium block chain.
- Identify the security issues of block chain technology.

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

CO1	Explain the fundamentals of block chain technology, block chain architecture, consensus mechanisms, cryptocurrencies, and various types of block chain systems **(L2-Understand)**
CO2	Describe the concepts of public, private, and consortium block chain systems along with smart contracts and blockchain platforms. (L2-Understand)
CO3	Apply blockchain concepts and smart contract methodologies in Bitcoin, Ethereum, Hyperledger, Ripple, and Corda environments. (L3-Apply)
CO4	Apply security, privacy, scalability, and regulatory concepts in blockchain systems for secure decentralized applications. (L3-Apply)
CO5	Apply blockchain technology concepts in real-time applications such as banking, healthcare, supply chain, IoT, retail, and financial services. (L3-Apply)

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	–	**2**	–	–	–	–	–	–	1	**2**	–	1
CO2	**3**	**2**	**2**	–	**2**	–	–	–	–	–	–	2	**2**	–	**2**
CO3	**3**	**3**	**3**	**2**	**3**	–	–	–	–	–	–	2	**3**	1	**3**
CO4	**3**	**3**	**2**	**2**	**2**	**2**	–	**3**	–	–	–	2	**2**	1	**3**
CO5	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	1	–	–	**2**	**2**	**2**	**3**
1-Low					**2–**Medium						**3 -**High				

Textbook:

1. "Blockchain Technology", Chandramouli Subramanian, Asha A.George, Abhilasj K A, Meena Karthikeyan, Universities Press.

Reference Books:

1. Blockchain Blueprint for Economy, Melanie Swan, SPD Oreilly.
2. Blockchain for Business, Jai Singh Arun, Jerry Cuomo, Nitin Gauar, Pearson Addition Wesley

PART-B

COURSEDELIVERYPLAN(LESSONPLAN):

UNIT-I: Fundamentals of Blockchain

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	Course Introduction, COs, Introduction to Blockchain	1	29-06-2026		1&2	
2	Origin of Blockchain	1	30-06-2026		1&2	
3	Blockchain Solution	1	02-07-2026		1&2	
4	Components of Blockchain	1	03-07-2026		1&2	
5	Block in a Blockchain	1	04-07-2026		1&2	
6	Blockchain Technology and Future	1	06-07-2026		1&2	
7	Decentralization and Distribution	1	07-07-2026		1&2	
8	Types of Blockchain	1	09-07-2026		1&2	
9	Consensus Protocol	2	11-07-2026		1&2	
10	Cryptocurrency Introduction	1	13-07-2026		1&2	
11	Bitcoin & Cryptocurrency	2	16-07-2026		1&2	
12	Cryptocurrency Basics	1	17-07-2026		1&2	
13	Types of Cryptocurrencies	1	18-07-2026		1&2	
14	Cryptocurrency Usage	1	20-07-2026		1&2	
15	Tutorial	1	22-07-2026			
No. of classes required to complete UNIT-I : 16				**No. of classes taken:**		

UNIT-II: Public Blockchain System:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16	Introduction to Public Blockchain	1	23-07-2026		1&2	
17	Public Blockchain	1	24-07-2026		1&2	
18	Popular Public Blockchains	2	28-07-2026		1&2	
19	Bitcoin Blockchain	2	31-07-2026		1&2	
20	Ethereum Blockchain	2	04-08-2026		1&2	
21	Smart Contract Introduction	1	06-08-2026		1&2	
22	Characteristics of Smart Contracts	1	07-08-2026		1&2	
23	Types of Smart Contracts	2	11-08-2026		1&2	
24	Types of Oracles	1	13-08-2026		1&2	
25	Smart Contracts in Ethereum	2	18-08-2026		1&2	
26	Smart Contracts in Industry	1	20-08-2026		1&2	
27	Tutorial	1	22-08-2026		1&2	
I MID EXAMINATIONS (24-08-2026 to 29-08-2026)						
No. of classes required to complete UNIT-II:17				**No. of classes taken:**		

UNIT-III: Private Blockchain System, Consortium Blockchain, Initial Coin Offering

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	Introduction to Private Blockchain	1	31-08-2026		1&2	
29	Characteristics of Private Blockchain	1	01-09-2026		1&2	
30	Private Blockchain Architecture	2	05-09-2026		1&2	
31	Private Blockchain Examples	1	07-09-2026		1&2	
32	Open Source Private Blockchain	1	08-09-2026		1&2	
33	E-Commerce Blockchain Example	2	11-09-2026		1&2	
34	Blockchain Commands	1	12-09-2026		1&2	
35	Smart Contract in Private Environment	1	14-09-2026		1&2	
36	State Machine	1	16-09-2026		1&2	
37	Permissioned Blockchain Algorithms	1	17-09-2026		1&2	
38	Byzantine Fault	1	18-09-2026		1&2	
39	Multichain	1	19-09-2026		1&2	
40	Consortium Blockchain	1	21-09-2026		1&2	
41	Hyperledger Platform	1	22-09-2026		1&2	
42	Ripple & Corda	1	24-09-2026		1&2	
43	Tutorial	1	25-09-2026		1&2	
No. of classes required to complete UNIT-III:16				**No. of classes taken:**		

UNIT-IV: Security in Blockchain, Applications of Blockchain

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44	Security in Blockchain	1	26-09-2026		1&2	
45	Security Aspects in Bitcoin	1	28-09-2026		1&2	
46	Security & Privacy Challenges	2	01-10-2026		1&2	
47	Performance & Scalability	1	03-10-2026		1&2	
48	Identity Management & Authentication	1	05-10-2026		1&2	
49	Regulatory Compliance	1	06-10-2026		1&2	
50	Smart Contract Security	2	09-10-2026		1&2	
51	Hyperledger Fabric Security	1	10-10-2026		1&2	
52	Applications of Blockchain	1	12-10-2026		1&2	
53	Banking & Finance	1	13-10-2026		1&2	
54	Education & Energy	1	15-10-2026		1&2	
55	Healthcare & Real Estate	1	16-10-2026		1&2	
56	Supply Chain & IoT, Limitations & Challenges	1	17-10-2026		1&2	
57	Tutorial	1	17-10-2026		1&2	
No. of classes required to complete UNIT-IV:16				**No. of classes taken:**		

UNIT-V: Blockchain Case Studies, Blockchain Platform using Python

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
58.	Introduction.	1	12-10-2026		1&2	
59.	Preliminaries.	1	14-10-2026		1&2	
60.	The Naive Algorithm.	1	16-10-2026		1&2	
61.	The Knutt-Morris-Pratt Algorithm.	1	17-10-2026		1&2	
62.	The Boyer-Moore Algorithm	1	26-10-2026		1&2	
63.	The Shift-Or Algorithm.	1	28-10-2026		1&2	
64.	The Shift-Or Algorithm continuation	1	30-10-2026		1&2	
65.	The Karp-Rabin Algorithm	1	31-10-2026		1&2	
66.	Tutorial	1	31-10-2026		1&2	
II MID EXAMINATIONS (02-11-2026 to 07-11-2026)						
No. of classes required to complete UNIT-V:09				**No. of classes taken:**		

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

PART-C

EVALUATIONPROCESS (R23Regulation):

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 (Units-III, IV & V)	**A2 = 5**
II-Descriptive Examination (Units-III, IV & V)	**M2 = 15**
II-Quiz Examination (Units-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 OUT COMES (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	**PO11 - 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	**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 Johnwesily Chappidi**	**Dr Johnwesily Chappidi**	**Dr. K.V. Panduranga Rao**	**Dr. S. JAYAPRADA**
Signature				

PART-A

Name of Course Instructor: L.Narendra
Course Name & Code : BIGDATA ANALYTICS & 23AD09
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech/VI-VII-B **A.Y.:** 2026-27

PREREQUISITE: Should have knowledge of one Programming Language (Java preferably), Practice of SQL (queries and sub queries), exposure to Linux Environment.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

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

CO1	understand the Sets, Maps and Generic Classes to manage the Big Data. **(Understand-L2)**
CO2	understand the HDFS, building blocks of Hadoop and configure the Hadoop clusters to store a huge volume of data. **(Understand-L2)**
CO3	Illustrate the Map Reduce mechanism to process a huge volume of data. **(Apply-L3)**
CO4	Illustrate the Spark Streaming mechanism and RDD operations. **(Apply-L3)**
CO5	Implement a high-level data processing and data warehouse for a huge volume of data by using Pig and Hive tools. **(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	3	1	-	-	**1**	-	-	-	-	-	-	2	-	-	-
CO2	2	-	2	-	**2**	-	-	-	-	-	-	2	**1**	-	-
CO3	2	-	2	-	**2**	-	-	-	-	-	-	2	**2**	-	-
CO4	2	3	-	-	**2**	-	-	-	-	-	-	2	**2**	-	-
CO5	2	3	-	-	**2**	-	-	-	-	-	-	2	-	-	-
1 - Low					**2 –**Medium								**3 -** High		

TEXTBOOKS:

T1 Wiley & Big Java 4th Edition, Cay Horstmann, Wiley John Sons, INC
T2 Hadoop: The Definitive Guide by Tom White, 3 rd. Edition, O'reilly

REFERENCE BOOKS:

R1 Hadoop in Action by Chuck Lam, MANNING Publ
R2 Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss
R3 Hadoop in Practice by Alex Holmes, MANNING Publ
R4 Big Data Analytics by Dr. A.Krishna Mohan and Dr.E.Laxmi Lydia

Software Links:

1. Hadoop: http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Data structures in java

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 Big Data, CEOs and Cos discussion	1	29-06-2026		TLM1	
2.	Data Structures in Java: Linked Lists	1	02-07-2026		TLM1	
3.	Stacks	1	02-07-2026		TLM1	
4.	Queues	1	03-07-2026		TLM1	
5.	Sets	1	04-07-2026		TLM1	
6.	Maps	1	06-07-2026		TLM1	
7.	Generics: Generic Classes	1	09-07-2026		TLM1	
8.	Type Parameters	1	09-07-2026		TLM1	
9.	Implementing Generic Types	1	10-07-2026		TLM1	
10.	Generic Methods	1	11-07-2026		TLM1	
11.	Generic Methods	1	13-07-2026		TLM1	
12.	Wrapper Classes	1	16-07-2026		TLM1	
13.	Wrapper Classes	1	16-07-2026		TLM1	
14.	Concept of serialization	1	17-07-2026		TLM1	
15.	Case Study	1	18-07-2026		TLM3	
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: working with big data

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	Working with big data	1	20-07-2026		TLM1/2	
17.	Google file system	1	23-07-2026		TLM1/2	
18.	Hadoop Distributed File System	1	23-07-2026		TLM1/2	
19.	Building blocks of Hadoop	1	24-07-2026		TLM1/2	
20.	Name node	1	25-07-2026		TLM1/2	
21.	Data node	1	27-07-2026		TLM1/2	
22.	Secondary name node	1	30-07-2026		TLM1/2	
23.	Job tracker	1	30-07-2026		TLM1/2	
24.	Task tracker	1	31-07-2026		TLM1/2	
25.	Configuring Hadoop clusters	1	01-08-2026		TLM1/2	
26.	Configuring XML files	1	03-08-2026		TLM1/2	
27.	Read operation	1	06-08-2026		TLM1/2	
28.	Write operation	1	06-08-2026		TLM1/2	
29.	HDFS commands	1	07-08-2026		TLM1/2	
30.	HDFS commands	1	08-08-2026		TLM1/2	
31.	HDFS commands	1	10-08-2026		TLM1/2	
32.	HDFS commands	1	13-08-2026		TLM1/2	
33.	HDFS commands	1	13-08-2026		TLM1/2	
34.	HDFS commands	1	14-08-2026		TLM1/2	
35.	HDFS commands	1	17-08-2026		TLM1/2	
36.	HDFS commands	1	20-08-2026		TLM1/2	
37.	HDFS commands	1	20-08-2026		TLM1/2	
38.	HDFS commands	1	21-08-2026		TLM1/2	

39.	Case Study	1	22-08-2026		TLM3	
No. of classes required to complete UNIT-II: 24				**No. of classes taken:**		

UNIT-III: Writing Map Reduce Programs

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
40.	A weather dataset	1	31-08-2026		TLM1/2	
41.	Understanding Hadoop API for MR	1	03-09-2026		TLM1/2	
42.	Old API	1	03-09-2026		TLM1/2	
43.	New API	1	05-09-2026		TLM1/2	
44.	Basic Map Reduce programs	1	07-09-2026		TLM1/2	
45.	Driver code	1	10-09-2026		TLM1/2	
46.	Mapper code	1	10-09-2026		TLM1/2	
47.	Reducer code	1	11-09-2026		TLM1/2	
48.	Record Reader	1	12-09-2026		TLM1/2	
49.	Combiner	1	17-09-2026		TLM1/2	
50.	Partitioner	1	17-09-2026		TLM1/2	
51.	YARN	1	18-09-2026		TLM1/2	
52.	Use case of Map Reduce	1	19-09-2026		TLM1/2	
53.	Case Study	1	21-09-2026		TLM3	
No. of classes required to complete UNIT-III: 14				**No. of classes taken:**		

UNIT-IV: Stream Memory and Spark

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
54.	Introduction to Stream concepts	1	24-09-2026		TLM1/2	
55.	Stream data model and architecture	1	24-09-2026		TLM1/2	
56.	Stream computing, Sampling Data in a Stream	1	25-09-2026		TLM1/2	
57.	Filtering Streams	1	26-09-2026		TLM1/2	
58.	Counting Distinct Elements in a Stream	1	28-09-2026		TLM1/2	
59.	Introduction to Spark Concept	1	01-10-2026		TLM1/2	
60.	Spark Architecture and components	1	01-10-2026		TLM1/2	
61.	Spark installation	1	03-10-2026		TLM1/2	
62.	Spark RDD(Resilient Distributed Dataset)	1	05-10-2026		TLM1/2	
63.	Spark RDD operations.	1	08-10-2026		TLM1/2	
64.	Spark RDD operations.	1	08-10-2026		TLM1/2	
65.	Case study	1	09-10-2026		TLM3	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Pig & Applying Structure to Hadoop Data with Hive

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
66.	Hadoop Programming Made Easier: Admiring the Pig	1	10-10-2026		TLM1/2	

	Architecture					
67.	going with the Pig Latin Application Flow	1	12-10-2026		TLM1/2	
68.	working through the ABCs of Pig Latin	1	15-10-2026		TLM1/2	
69.	Evaluating Local and Distributed Modes of Running Pig Scripts	1	15-10-2026		TLM1/2	
70.	Checking out the Pig Script Interfaces	1	16-10-2026		TLM1/2	
71.	Scripting with Pig Latin.	1	17-10-2026		TLM1/2	
72.	Saying Hello to Hive, Seeing How the Hive is Put Together,	1	26-10-2026		TLM1/2	
73.	Getting Started with Apache Hive	1	29-10-2026		TLM1/2	
74.	Examining the Hive Clients, Working with Hive Data Types	1	29-10-2026		TLM1/2	
75.	Creating and Managing Databases and Tables	1	30-10-2026		TLM1/2	
76.	Seeing How the Hive Data Manipulation Language Works	1	31-10-2026		TLM1/2	
77.	Querying and Analyzing data	1	31-10-2026		TLM3	
No. of classes required to complete UNIT-V: 12				**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.	BDA Use case – I	1	30-10-2026		TLM2	
2.	BDA Use case – II	1	31-10-2026		TLM2	
				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

Internal Mid Examinations Dates	
I-MID Examinations	24-08-2026 to 29-08-2026
II-MID Examinations	02-11-2026 to 07-11-2026

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

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	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.L.Narendra**	**Mr.L.Narendra**	**Dr.K.V.Panduranga Rao**	**Dr. S. Jayaprada**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING(AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: V.SAI PRASANNA
Course Name & Code : Constitution Of India 23MC05
L-T-P Structure : **2 0 0** **Credits:** 2
Program-Sem-Sec : IV B.Tech., VII-Sem, B-Sec **A.Y.: 2026-27**

Prerequisites:

Course Objectives: The main objectives of the course is to

- To make students understand the historical background and philosophy of the Indian Constitution.
- To make students acquire knowledge of Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties.
- To make students understand the structure, powers, and functions of the Legislature, Executive, and Judiciary.
- To make students analyze the role and functioning of local self-government institutions and grassroots democracy.
- To make students understand the role of the Election Commission and constitutional bodies for the welfare of marginalized sections.

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

CO1	Explain the history, philosophy, and salient features of the Indian Constitution. **(Understand-L2)**
CO2	Describe Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties. **(Understand-L2)**
CO3	List the powers and functions of the Legislature, Executive, and Judiciary. **(Remembering L1)**
CO4	Interpret the structure and functioning of local administration and Panchayati Raj institutions. **(Understand-L2)**
CO5	Explain the role of the Election Commission and welfare institutions for SC-ST-OBC and women. **(Understand-L2)**

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

CO	Program Outcomes (PO ' S)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	2	3	-	2	-	2	-	3	3
CO2	-	-	-	-	-	3	2	3	-	2	-	2	-	3	3
CO3	-	-	-	-	-	3	-	2	-	2	-	1	3	2	-
CO4	-	-	-	-	-	3	2	2	-	2	-	1	1	3	-
CO5	-	-	-	-	-	3	-	2	-	2	-	1	-	3	2

Textbooks:

1. The Constitution of India, 1st Edition, (Bare Act), Government Publication, 1950
   2.Framing of Indian Constitution, 1st Edition, Dr. S. N. Busi, Dr. B. R. Ambedkar 2015

Reference Books:

Indian Constitution Law, 7th Edition, M. P. Jain, Lexis Nexis, 2014.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: History of Making of the Indian Constitution

S.No	Topics to be Covered	No. of Classes	Tentative Date	Actual Date	Teaching Learning Methods	HOD Sign
1.	History	1	29-6-26		TLM1/2	
2.	Drafting Committee	1	3-7-26		TLM1/2	
3.	Composition & Working	1	6-7-26		TLM1/2	
4.	Philosophy of the Indian Constitution	1	10-7-26		TLM1/2	
5.	Preamble	1	13-7-26		TLM1/2	
6.	SalientFeatures	1	17-7-26		TLM1/2	

UNIT-II: Contours of Constitutional Rights & Duties

S.No	Topics to be Covered	No. of Classes	Tentative Date	Actual Date	Teaching Learning Methods	HOD Sign
7.	Fundamental Rights, ,	1	20-7-26		TLM1/2	
8.	Right to Equality	1	24-7-26		TLM1/2	
9.	Right to Freedom	1	27-7-26		TLM1/2	

10.	Right against Exploitation	1	31-7-26		TLM1/2	
11.	Right to Freedom of Religion ,Cultural and EducationalRights	1	3-8-26		TLM1/2	
12.	Right to Constitutional Remedies	1	7-8-26		TLM1/2	
13.	Directive Principles of State Policy	1	10-8-26		TLM1/2	
14.	Fundamental Duties.	1	14-8-26		TLM1/2	
No. of classes required to complete **UNIT-II: 8**				**No. of classes taken:**		

UNIT-III: Organs of Governance

S.No	**Topics to be Covered**	**No. of Classes**	**Tentative Date**	**Actual Date**	**Teaching Learning Methods**	**HOD Sign**
15.	Parliament Composition	1	17-8-26		TLM1/2	
16.	Qualifications and Disqualifications	1	21-8-26		TLM1/2	
17.	Powers and Functions	1	31-8-26		TLM1/2	
18.	Executive-President, Governor,	1	7-9-26		TLM1/2	
19.	Council of Ministers, Judiciary	1	11-9-26		TLM1/2	
20.	Appointment and Transfer of Judges	1	18-9-26		TLM1/2	
21.	Qualifications, Powers and Functions	1	21-9-26		TLM1/2	
No. of classes required to complete UNIT-III: 7				**No. of classes taken**		

UNIT-IV: Local Administration

S.No	**Topics to be Covered**	**No. of Classes**	**Tentative Date**	**Actual Date**	**Teaching Learning Methods**	**HOD Sign**
22.	District's Administration head: Role and Importance,	1	25-9-26		TLM1/2	
23.	Municipalities: Introduction	1	28-9-26		TLM1/2	

24.	Mayor and role of Elected Representative CEO of Municipal Corporation	1	5-10-26		TLM1/2	
25.	Panchayati raj: Introduction	1	9-10-26		TLM1/2	
26.	PRI: Zila Panchayat, Elected officials and their 176 roles	1	9-10-26		TLM1/2	
27.	CEO ZilaPachayat: Position and role	1	12-10-26		TLM1/2	
28.	Block level: Organizational Hierarchy (Different departments)	1	12-10-26		TLM1/2	
29.	Village level: Role of Elected and Appointed officials	1	16-10-26		TLM1/2	
30.	Importance of grass root democracy	1	16-10-26		TLM1/2	
No. of classes required to complete UNIT-IV: 9				**No. of classes taken**		

UNIT-V: Election Commission

S.No	**Topics to be Covered**	**No. of Classes**	**Tentative Date**	**Actual Date**	**Teaching Learning Methods**	**HOD Sign**
31.	Election Commission	1	26-10-26		TLM1/2	
32.	Role and Functioning, Chief Election Commissioner and Election Commissioners,	1	26-10-26		TLM1/2	
33.	State Election Commission	1	30-10-26		TLM1/2	

34.	Role and Functioning	1	30-10-26		TLM1/2	
35.	Institute and Bodies for the welfare of SC-ST-OBC and women	1	30-10-26		TLM1/2	
No. of classes required to complete UNIT-V: 5				**No. of classes taken**		

TOTAL CLASSES:6+8+7+9+5=**35**

Teaching Learning Methods			
TLM1/2	Chalk and Talk	**TLM4**	Demonstration (Lab-Field Visit)
TLM1/2	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

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	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	**Ms.V.SAI PRASANNA**	**Dr.Ch.RAJENDRA BABU**		**Dr. S. JAYAPRADA**
Signature				

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor : J. Eeshwar Ram
Course Name & Code : ENVIRONMENTAL SANITATION & 23CE83
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., VII-Sem., CSM-B A.Y : 2026-27

PRE-REQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course teaches the basic terminology of Environmental sanitation, different methods for control of Communicable and non-communicable diseases, the control techniques for rodent and vectors, sanitation measures that are required in few Institutions, sanitation management aspects due to rural and refuse wastes.

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

CO 1	Explain the basic terminology of Environmental sanitation, different diseases, rural and refuse sanitation (Understand-L2)
CO 2	Identify the impacts and ways to control Communicable and non-communicable diseases (Understand-L2)
CO 3	Review and assess the control approaches for rodent and insect vectors (Understand-L2)
CO 4	Classify the appropriate sanitation measures for several institutions (Understand-L2)
CO 5	Select the appropriate measures to be taken for rural and refuse management (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	2	-	-	-	-	1	1	-	-	-	-	1	1	-	1
CO2	2	-	-	-	-	1	1	-	-	-	-	1	1	-	1
CO3	2	-	-	-	-	1	1	-	-	-	-	1	1	-	1
CO4	2	-	-	-	-	1	1	-	-	-	-	1	1	-	1
CO5	3	-	-	-	-	1	1	-	-	-	-	1	1	-	1

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

TEXT BOOKS:

T1 Joseph. A. Salvato, Nelson N. Nemerow, Frankiln J. Agardy, "Environmental Engineering", John Wiley & Sons, 5th Edition, 2003.

T2 I.M. Prahlad Edited, "Environmental Sanitation - Reflections from Practice, A Module for Community Health Practitioners", Society For Community Health Awareness Research and Action, 2015.

REFERENCE BOOKS:

R1 S.K. Garg, "Sewage Disposal and Air pollution engineering", Khanna Publishers, New Delhi, 2009.

R2 K.V.S.G. Muralikrishna, "Environmental Sanitation", Reem Publications, Kakinada, 2003.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT –I: ENVIRONMENTAL SANITATION BASICS

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.	CO's and PO's	1	29-06-2026		**TLM2**	
2.	Introduction of sanitation practices	1	30-06-2026		**TLM2**	
3.	History sanitation practices	1	02-07-2026		**TLM2**	
4.	Evolution of sanitation practices	1	04-07-2026		**TLM2**	
5.	Role of Sanitary Engineer	1	06-07-2026		**TLM2**	
6.	Sanitation management aspects for liquid wastes	1	07-07-2026		**TLM2**	
7.	Sanitation management aspects for solid wastes	1	09-07-2026		**TLM2**	
8.	Basic Definitions	1	11-07-2026		**TLM2**	
9.	Types of diseases- Communicable diseases	1	13-07-2026		**TLM2**	
10.	Non-communicable diseases	1	14-07-2026		**TLM2**	
11.	Water borne diseases	1	16-07-2026		**TLM2**	
12.	Mortality rates	1	18-07-2026		**TLM2**	
No. of classes required to complete UNIT-I:12				No. of classes taken:		

UNIT-II: CONTROL OF COMMUNICABLE AND NON-COMMUNICABLE DISEASES

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.	**Communicable Diseases:** Impacts,	1	20-07-2026		**TLM2**	
2.	Control of Source (Agent Factors)	1	21-07-2026		**TLM2**	
3.	Control of Mode of Transmission Factor (Environmental Factors)	1	23-07-2026		**TLM2**	
4.	Control of Mode of Transmission Factor (Environmental Factors)	1	25-07-2026		**TLM2**	
5.	Control of Susceptibles (Host Factors)	1	27-07-2026		**TLM2**	
6.	Epidemic Control	1	28-07-2026		**TLM2**	
7.	Respiratory Diseases- Types, Impacts, Characteristics	1	30-07-2026		**TLM2**	
8.	Respiratory Diseases- Control	1	01-08-2026		**TLM2**	
9.	Water borne Diseases- Types, Impacts, Characteristics	1	03-08-2026		**TLM2**	
10.	Water borne Diseases- Control	1	04-08-2026		**TLM2**	

11.	Food borne Diseases- Types, Impacts, Characteristics	1	06-08-2026		**TLM2**	
12.	Food borne Diseases- Control	1	08-08-2026		**TLM2**	
No. of classes required to complete UNIT-II:12				No. of classes taken:		

UNIT-III: INSECT VECTOR AND RODENT 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
1.	Mosquitoes as carriers of diseases	1	10-08-2026		**TLM2**	
2.	Mosquito control	1	11-08-2026		**TLM2**	
3.	Larvae control	1	13-08-2026		**TLM2**	
4.	Adult control	1	17-08-2026		**TLM2**	
5.	Man-made mosquito breeding centres	1	18-08-2026		**TLM2**	
6.	Outdoor control of mosquitoes	1	20-08-2026		**TLM2**	
7.	Housefly as disease carrier	1	22-08-2026		**TLM2**	
8.	Fly control	1	31-08-2026		**TLM2**	
9.	Rodent control	1	01-09-2026		**TLM2**	
10.	Control Diseases transmitted from Animals.	1	03-09-2026		**TLM2**	
No. of classes required to complete UNIT-III:10				No. of classes taken:		

UNIT- IV: INSTITUTIONAL SANITATION

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.	Sanitation measures in hotels	1	05-09-2026		**TLM2**	
2.	Sanitation measures in Restaurants	1	07-09-2026		**TLM2**	
3.	Sanitation measures in public bathing ghats	1	08-09-2026		**TLM2**	
4.	Sanitation measures in Schools	1	10-09-2026		**TLM2**	
5.	Sanitation measures in Schools	1	12-09-2026		**TLM2**	
6.	Sanitation measures in Hospitals	1	15-09-2026		**TLM2**	
7.	Sanitation measures in Hospitals	1	17-09-2026		**TLM2**	
8.	Sanitation measures in Swimming pools	1	19-09-2026		**TLM2**	
9.	Sanitation measures in Swimming pools	1	21-09-2026		**TLM2**	
10.	Sanitation measures in Prisons.	1	22-09-2026		**TLM2**	
11.	Revision	1	24-09-2026		**TLM2**	
12.	Revision	1	26-09-2026		**TLM2**	
No. of classes required to complete UNIT-IV:10				No. of classes taken:		

UNIT-V : RURAL AND REFUSE SANITATION

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.	**Rural sanitation**: Aqua privy, Septic tank, Soak pit and sulabh mode of sanitation	1	28-09-2026		**TLM2**	
2.	**Rural sanitation**: Appropriate low-cost rural sanitation techniques	1	29-09-2026		**TLM2**	
3.	**Rural sanitation**: Biogas generation from toilet	1	01-10-2026		**TLM2**	
4.	**Refuse Sanitation:** Municipal garbage – sources, generation and collection	1	03-10-2026		**TLM2**	
5.	**Refuse Sanitation:** Municipal garbage – recovery and disposal options	1	05-10-2026		**TLM2**	
6.	**Refuse Sanitation:** Sanitation problems with regard to: Dumping and sanitary landfilling	1	06-10-2026		**TLM2**	
7.	**Refuse Sanitation:** Sanitation problems with regard to: Mass firing of waste and incineration	1	08-10-2026		**TLM2**	
8.	**Refuse Sanitation:** Mosquito breeding, Leachate, Management issues	1	10-10-2026		**TLM2**	
9.	**Ecological Sanitation:** Principle, Eco-sanitation as a sustainable approach	1	12-10-2026		**TLM2**	
10.	**Occupational health hazards:** Concept, Types, Safety aspects of sanitation workers	1	13-10-2026		**TLM2**	
11.	**Revision**	1	15-10-2026 17-10-2026		**TLM2**	
12	**Revision For mid-2**	1	26-10-2026 to 31-10-2026		**TLM2**	
No. of classes required to complete UNIT-V:10				No. of classes taken:		

Teaching Learning Methods					
TLM1	Chalk and Talk	**TLM4**	Problem Solving	**TLM7**	Seminars or GD
TLM2	PPT	**TLM5**	Programming	**TLM8**	Lab Demo
TLM3	Tutorial	**TLM6**	Assignment or Quiz	**TLM9**	Case Study

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

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	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	**J. Eeshwar Ram**	**B. Ramakrishna**	**J Rangaiah**	**Dr. K V Ramana**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs. YARAMALA NAGAMANI
Course Name & Code : HUMAN RESOURCES & PROJECT MANAGEMENT (23HS03)
L-T-P Structure : **2-0-0** **Credits:** 2
Program/Sem/Sec : B.Tech/VII SEM /B **A.Y.:** 2026-27
Regulations : R23

PREREQUISITE: Basic knowledge of management principles and organizational functions.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To explain the fundamentals of Human Resource Management and HR planning.
- To introduce training, development, performance appraisal, and career management.
- To discuss project management concepts, life cycle, and resource allocation.
- To compare project types and their unique management challenges.
- To apply project planning, implementation, control, and evaluation practices.

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

CO	Outcome	Bloom's Level
CO1	Explain fundamentals of HRM and HR planning	L2 – Understand
CO2	State training, development, and performance appraisal techniques	L1 – Remember
CO3	Interpret project management concepts and life cycle stages	L2 – Understand
CO4	Compare project types and their management challenges	L2 – Understand
CO5	Apply project planning, implementation, and evaluation techniques	L3 – Apply

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

COs / POs & PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	–	–	–	–	–	1	–	1	2	2	2	1	–	–	–
CO2	–	–	–	–	–	1	–	2	2	2	2	1	–	–	–
CO3	–	1	1	–	1	–	–	–	2	2	3	1	1	–	1
CO4	–	2	2	1	1	1	1	–	2	2	3	1	1	1	2
CO5	1	2	3	2	2	1	1	1	3	2	3	2	2	2	3

Scale: 1 – Low, 2 – Medium, 3 – High

TEXTBOOKS:

T1	Robert L. Mathis, John H. Jackson, Manas Ranjan Tripathy, *Human Resource Management*, Cengage Learning, 2016.
T2	Sharon Pande & Swapnalekha Basak, *Human Resource Management: Text and Cases*, Vikas Publishing, 2016.
T3	Stewart R. Clegg, Torgeir Skyttermoen, Anne Live Vaagaasar, *Project Management*, Sage Publications, 2021.
T4	K. Nagarajan, *Project Management*, New Age International Publishers, 2017.

REFERENCE BOOKS:

R1	Subba Rao P, *Personnel and Human Resource Management*, Himalaya Publications, 2013.
R2	K. Aswathappa, *Human Resource and Personnel Management*, Tata McGraw Hill, 2013.
R3	Prasanna Chandra, *Projects: Planning, Analysis, Selection, Financing, Implementation and Review*, Tata McGraw Hill, 1998.
R4	Vasanth Desai, *Project Management*, Himalaya Publications, 2018.
R5	Lalitha Balakrishnan & Gowri, *Project Management*, Himalaya Publishing House, 2022.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: HRM Fundamentals

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 HRM, Nature, Scope of HRM	2	01/07/26		TLM, 2	
2.	Functions of HRM	1	03/07/26		TLM1, 2	
3.	Role of HR Manager,	1	04/07/26		TLM1, 2	
4.	Emerging Trends	1	08/07/26		TLM1, 2	
5.	E-HRM, HR Audit Models	1	11/07/26		TLM, 2	
6.	HR Planning	1	15/07/26		TLM1, 2	
7.	Demand & Supply Forecasting	1	17/07/26		TLM1, 2	
8.	Job Design	1	18/07/26		TLM , 2	
9.	Recruitment Sources	1	22/07/26		TLM1, 2	
10.	Selection Procedures	1	24/07/26		TLM, 2	
11.	Tutorial /Activity / Assignment	2	25/07/26		TLM 3/7	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: HRD & Performance Management

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	HRD	1	29/07/26		TLM1,2	
13.	HR Accounting Models	1	05/08/26		TLM1,2	
14.	Training & Development Methods	2	07/08/26		TLM1,2	
15.	Performance Appraisal Techniques	1	08/08/26		TLM1,2	
16.	Career Development	1	12/08/26		TLM1,2	
17.	Counseling and Group Interaction	1	14/08/26		TLM1,2	
18.	Tutorial /Activity / Assignment	2	19/08/26		TLM 3/7	
No. of classes required to complete UNIT-II: 9				**No. of classes taken:**		

UNIT-III: Project Management Basics

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	Concept of Resource Management	1	21/08/26		TLM1,2	
20.	Project Environment	1	22/08/26		TLM1,2	
21.	Types of Projects	1	02/09/26		TLM1,2	
22.	DPR and Project Networks	1	05/09/26		TLM1,2	
23.	Project Life Cycle,	1	09/09/26		TLM1,2	
24.	Project Proposals, Monitoring Progress	1	11/09/26		TLM1,2	
25.	Project Appraisal & Selection,	1	12/09/26		TLM1,2	
26.	80-20 Rule, Communication Matrix	1	16/09/26		TLM1,2	
27.	Tutorial /Activity / Assignment	2	19/09/26		TLM 3/7	
No. of classes required to complete UNIT-III: 10				**No. of classes taken:**		

UNIT-IV: Project Challenges

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.	Unique Management Challenges for Different Project Types	3	23,25,26/09/26		TLM1,2	
29.	Abandonment Analysis	1	03/10/26		TLM1,2	
30.	Tutorial /Activity / Assignment	3	07/10/26		TLM 3/7	
No. of classes required to complete UNIT-IV: 7				**No. of classes taken:**		

UNIT-V: Project Implementation & Review

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	Forms of Project Organization	1	10/10/26		TLM1,2	
32.	Project Planning & Control	1	1410/26		TLM1,2	
33.	Human Aspects of Project Management	1	16/10/26		TLM1,2	
34.	Prerequisites for Successful Implementation	1	17/10/26		TLM1,2	
35.	Project Review	1	28/10/26		TLM1,2	
36.	Performance Evaluation, Abandonment Analysis	1	30/10/26		TLM1,2	
37.	Tutorial / Activity / Assignment	1	31/10/26		TLM3/7	
38.	II-MID EXAMS	2/11/26		7/11/26		
No. of classes required to complete UNIT-V: 7				**No. of classes taken:**		

Contents 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.	Performance Appraisal	08/08/26			**TLM 3**	

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 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.

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.

Mrs. Y NAGAMANI	Mrs. Y NAGAMANI	Dr. K DEEPIKA	Dr. K DEEPIKA
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

PROGRAM: B.Tech. VII-Sem. (B Section) **ACADEMIC YEAR:** 2026-27
COURSE NAME & CODE: Prompt Engineering (23AMS1). **L-T-P:** 0-1-2
COURSE CREDITS: 2
COURSE INSTRUCTOR: Dr. K. V. Panduranga Rao

PRE-REQUISITE: Linear Algebra, Python Programming

Course Educational Objective:

The main objectives of the course are to

- Apply iterative prompting for clarity and context.
- Create varied prompts to steer model outputs.
- Construct a chain of thought and structured prompts.
- Develop retrieval-augmented pipelines to ground outputs.
- Evaluate LLM agents and multimodal apps for ethics and robustness.

Course Outcomes (CO): At the end of this course, the student will be able to:

- **CO1:** Understand the fundamental principles, techniques, and design patterns of effective prompt engineering.
- **CO2:** Apply prompt engineering techniques (e.g., zero-shot, few-shot, chain-of-thought) to enhance model performance.
- **CO3:** Utilize Large Language Models (LLMs) to generate text, images, and code for creative and practical applications.
- **CO4:** Evaluate LLM outputs using metrics like accuracy and relevance, and refine prompts to minimize hallucinations and bias.
- **CO5:** Implement ethical, safe, and secure prompting strategies to comply with data privacy and legal standards.

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

CO / PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	1	-	-	-	-	1	-	1	1	1	1
CO2	2	3	3	1	3	-	-	-	-	-	-	1	2	2	2
CO3	1	2	3	2	3	-	-	-	-	2	-	1	3	2	3
CO4	2	3	2	3	2	-	-	2	-	-	-	1	2	3	2
CO5	1	1	2	-	1	3	-	3	-	-	-	3	1	1	3

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

PROMPT ENGINEERING (LESSON PLAN) : B-Section

Expt. No	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Environment & Connectivity: Install required packages (e.g., transformers, OpenAI); securely configure the API key; run a simple "Hello, world" prompt to verify model access. Baseline vs. Enhanced Prompts: Execute a naïve prompt ("Write a one-paragraph bio of Ada Lovelace.") and an enhanced prompt that adds role framing, specificity, and explicit format instructions; compare both outputs for relevance, completeness, and style.	3	30/06/2026		TLM8 TLM5	
2	Definition of prompt engineering, Distinction between prompt engineering and model fine-tuning, Motivation and benefits of prompt engineering,	1	29/06/2026		TLM8 TLM2	
3	Iterative Refinement on a Simple Task: Summarize the plot of the Shakespearean play Romeo and Juliet in two sentences through three rounds of prompt tweaking: a. Minimal instruction. b. Addition of length and style constraints c. Specification of key content elements (setting and theme) Document how each iteration changes and improves the result. Diagnosing Prompt Failures & Edge Cases: Craft a vague or contradictory prompt; analyze the failure mode (ambiguity, missing context, or format errors); refine the prompt by adding examples or clarifying instructions.	3	07/07/2026		TLM8 TLM5	
4	Core principles of effective prompt design, Anatomy of a prompt, Setting up the Python environment	1	06/07/2026		TLM8 TLM2	

	for LLM interaction, Iterative prompting lifecycle, Common prompt pitfalls and remediation					
5	Few-Shot vs. Zero-Shot Comparison: Design and execute a zero-shot prompt and a few-shot prompt (with 2–3 exemplar input-output pairs) for a chosen text task (e.g., sentiment classification or translation); compare outputs for accuracy, consistency, and adherence to examples.	3	14/07/2026		TLM8 TLM5	
6	Enhanced prompt anatomy: contextual detail and explicit output specifications, Few-shot in-context prompting, Prompt structuring and template design,	1	13/07/2026		TLM8 TLM2	
7	Role-Based & Negative Prompting: Craft a role-based prompt to establish a specific persona (e.g., "You are a financial advisor…"); then create a negative prompt to suppress undesired content (e.g., "Do not mention any brand names"); evaluate how each influences the model's response.	3	21/07/2026		TLM8 TLM5	
8	Role-based prompting to establish personas or system behavior, Negative prompting to filter or suppress undesired content,	1	20/07/2026		TLM8 TLM2	
9	Constraint Specification & Iterative Refinement: Select an open-ended task (e.g., summarizing a technical article); issue a basic prompt; identify failures in length or format; refine the prompt by adding explicit constraints (word count, bullet format, etc.); document improvements over two refinement cycles.	3	28/07/2026		TLM8 TLM5	
10	Constraint specification and instruction enforcement (e.g., length, format), Iterative prompt refinement and optimization	1	27/07/2026		TLM8 TLM2	
11	Structured Format Prompting: Instruct the model to output information as bullet lists and Markdown tables (e.g., "List three benefits of daily exercise in a Markdown table with columns 'Benefit' and 'Description.'"); verify the output matches the requested structure.	3	04/08/2026		TLM8 TLM5	
12	Importance of structured outputs for real-world applications,	1	03/08/2026		TLM8 TLM2	

	Prompting for specific formats (lists, tables, Markdown),					
13	JSON/YAML Generation: Provide a brief dataset description (e.g., three books with title, author, publication year) and prompt the model to produce valid JSON or YAML; use a parser to validate syntax and refine the prompt if errors occur.	3	11/08/2026		TLM8 TLM5	
14	Generating valid JSON and YAML via explicit instructions	1	10/08/2026		TLM8 TLM2	
15	Chain-of-Thought & Task Decomposition: Present a multi-step problem (e.g., a logic puzzle) and apply zero-shot CoT prompting (e.g., "Let's think step by step. Explain your reasoning before the final answer."); separately, decompose the problem into sequential sub-questions, collect partial answers, combine them, and compare accuracy against a direct-answer baseline.	3	18/08/2026		TLM8 TLM5	
16	Eliciting chain-of-thought reasoning in zero-shot prompts, Decomposing complex tasks into manageable sub-tasks	1	17/08/2026		TLM8 TLM2	
17	Building a Simple LCEL Chain: Create a minimal LCEL script that accepts a fixed instruction (e.g., "Summarize this text: …"), passes it to an LLM, and prints the result; verify end-to-end execution.	3	01/09/2026		TLM8 TLM5	
18	Limitations of LLM internal knowledge, Need for external data sources, Introduction to Retrieval Augmented Generation (RAG)	1	31/08/2026		TLM8 TLM2	
19	Basic Data Indexing for RAG: Load a small collection of documents; split into uniform chunks (e.g., 200 tokens); generate embeddings for each chunk; store them in an in memory vector store; inspect for consistency.	3	08/09/2026		TLM8 TLM5	
20	Overview of RAG architecture (indexing vs. retrieval + generation), Getting started with LangChain for LLM applications,	1	07/09/2026		TLM8 TLM2	
21	Constructing & Running a Basic RAG Chain: Build a pipeline that: a. Receives a user query b. Retrieves the top-k relevant chunks c. Constructs a combined prompt with context + query d. Send it to the LLM e. Returns the answer	3	15/09/2026		TLM8 TLM5	

22	Basics of LangChain Expression Language (LCEL), Simplified indexing pipeline: document loading & text splitting	1	14/09/2026		TLM8 TLM2	
23	Constructing & Running a Basic RAG Chain: Build a pipeline that: a. Receives a user query b. Retrieves the top-k relevant chunks c. Constructs a combined prompt with context + query d. Send it to the LLM e. Returns the answer	3	22/09/2026		TLM8 TLM5	
24	Fundamentals of embeddings and vector stores, Building a basic retrieval generation pipeline with an LCEL chain	1	21/09/2026		TLM8 TLM2	
25	Building a Simple LLM Agent: Register a tool (e.g., a calculator function) and craft prompts that instruct the agent to invoke it when required; implement using LangChain or a function-calling API; test on queries requiring tool execution.	3	29/09/2026		TLM8 TLM5	
26	Introduction to LLM agents and their basic architecture, Overview of multimodal AI models (VLMs),	1	28/09/2026		TLM8 TLM2	
27	Building a Simple LLM Agent: Register a tool (e.g., a calculator function) and craft prompts that instruct the agent to invoke it when required; implement using LangChain or a function-calling API; test on queries requiring tool execution.	3	06/10/2026		TLM8 TLM5	
28	Prompting for text-to image generation and image understanding, Importance of prompt evaluation beyond subjective judgment	1	05/10/2026		TLM8 TLM2	
29	Multimodal Prompting Exploration: Generate images from detailed text prompts; feed one generated image into an image-understanding model or API with an appropriate prompt; compare the returned caption to the original prompt to evaluate alignment.	3	13/10/2026		TLM8 TLM5	
30	Manual evaluation techniques (heuristic checks for accuracy, relevance, format), Introduction to "LLM-as-Judge" for automated evaluation, Security considerations (prompt injection, sensitive-information risks)	1	12/10/2026		TLM8 TLM2	
31	Prompt Evaluation & Ethics Workshop: a. Select two existing	3	27/10/2026		TLM8 TLM5	

	prompts and generate multiple outputs; apply manual heuristic checks for accuracy, relevance, and format compliance. b. Use an "LLM-as-Judge" prompt (e.g., "Rate these outputs on a scale of 1–5 for clarity and correctness.") to automate evaluation. c. Design a prompt- injection test (e.g., "Ignore previous instructions…"), observe the response, then refine system prompts to mitigate the vulnerability.					
32	Prompt-based mitigation strategies for safety and robustness, Ethical concerns (bias, misinformation, data privacy) ,Brief exploration of UI frameworks (Streamlit/Gradio) for deploying prompt-driven apps, Adapting to the evolving nature of prompt engineering through continuous learning	1	26/10/2026		TLM8 TLM2	

Teaching Learning Methods					
TLM1	Chalk and Talk	**TLM4**	Problem Solving	**TLM7**	Seminars or GD
TLM2	PPT	**TLM5**	Programming	**TLM8**	Lab Demo
TLM3	Tutorial	**TLM6**	Assignment or Quiz	**TLM9**	Case Study

PART-C

EVALUATION PROCESS (R23 Regulations):

According to the Academic Regulations of R23, the 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 a 3-hour duration and evaluated for 70 marks. The performance of the student shall be evaluated as per the parameters indicated below:

Parameter	**Marks**
Procedure/Algorithm	20
Experimentation/Program execution	30
Observations/Calculations/Validation	
Result/Inference	
Viva voce	20
Total	70

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.
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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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. K.V. Panduranga Rao	**Dr. K.V. Panduranga Rao**	**Dr. SK. Salma Asiya Begam**	**Dr. S. Jayaprada**

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. S. Jayaprada
Course Name & Code : Reinforcement Learning & 23AM09
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B. Tech/VII/B **A.Y.:** 2026-27

PREREQUISITES : Basic knowledge of Artificial Intelligence and Machine Learning concepts, Fundamentals of Probability and Statistics.

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

- To introduce the fundamental concepts, principles, and framework of Reinforcement Learning and intelligent decision-making systems.
- To understand various reinforcement learning techniques including multi-armed bandits, Markov Decision Processes, Monte Carlo methods, and temporal learning approaches.
- To familiarize students with value functions, policy optimization, reward mechanisms, and agent–environment interactions for solving sequential decision problems.
- To provide knowledge of reinforcement learning algorithms and their implementation in real-world applications such as robotics, game playing, scheduling, automation, and intelligent control systems.

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

CO1	Understand the elements of Reinforcement Learning. **(Understand-L2)**
CO2	Apply Reinforcement Learning techniques to solve the n-armed Bandit problem. **(Apply-L3)**
CO3	Analyze and compare different Finite Markov Decision Processes based on their states, actions, transition probabilities, and reward mechanisms. **(Analyze-L4)**
CO4	Apply Monte Carlo Methods in solving real world problems. **(Apply-L3)**
CO5	Analyze the Applications and Case Studies of Reinforcement Learning. **(Analyze-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	2	2	1	-	-	-	-	-	-	-	-	1	1	-	2
CO2	3	2	2	2	2	-	-	-	-	-	-	2	2	2	-
CO3	3	3	2	2	2	-	-	-	-	-	-	2	2	2	2
CO4	2	2	-	2	2	-	-	-	-	-	-	2	2	2	-
CO5	2	2	2	2	2	-	-	-	-	-	-	2	2	2	2
1 - Low **2 –**Medium **3 -** High															

Text Books:

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement Learning- An Introduction",2nd Edition, The MIT Press,2018
2. Marco Wiering, Martijn van Otterlo Reinforcement Learning: State-of-the- Art (Adaptation, Learning, and Optimization (12))2012thEdition

Reference Books:

1. Vincent François-Lavet, Peter Henderson, Riashat Islam, An Introduction to Deep Reinforcement Learning (Foundations and Trends(r) in Machine Learning) , 2019.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: The Reinforcement Learning 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
1.	Introduction to Course and COs	1	29-06-2026		TLM1,2	
2.	Reinforcement Learning, Examples	2	30-06-2026 01-07-2026		TLM1,2	
3.	Elements of Reinforcement Learning	2	03-07-2026 04-07-2026		TLM1,2	
4.	Tutorial Class	1	06-07-2026		TLM 3	
5.	Limitations and Scope	1	07-07-2026		TLM1,2	
6.	An Extended Example: Tic- Tac-Toe	2	08-07-2026 10-07-2026		TLM1,2,6	
7.	Summary	1	13-07-2026		TLM1,2	
8.	History of Reinforcement Learning	2	14-07-2026 15-07-2026		TLM1,2	
9.	Tutorial Class	1	17-07-2026		TLM 3	
10.	**UNIT TEST-1**	1	18-07-2026		TLM 5	
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT-II: Multi-arm Bandits

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.	An n-Armed Bandit Problem	1	20-07-2026		TLM1,2	
2.	Action-Value Methods	2	21-07-2026 22-07-2026		TLM1,2	
3.	Incremental Implementation	1	24-07-2026		TLM1,2	
4.	Tutorial Class	1	25-07-2026		TLM 3	
5.	Tracking a Nonstationary Problem	2	27-07-2026 28-07-2026		TLM1,2, 6	
6.	Optimistic Initial Values	1	29-07-2026		TLM1,2	
7.	Upper-Confidence-Bound Action Selection	1	31-07-2026		TLM1,2	
8.	Tutorial Class	1	01-08-2026		TLM 3	
9.	Gradient Bandits	2	03-08-2026 04-08-2026		TLM1,2	
10.	Associative Search (Contextual Bandits)	2	05-08-2026 07-08-2026		TLM1,2	
11.	Tutorial Class	1	10-08-2026		TLM 3	
12.	**Unit Test-2**	1	11-08-2026		TLM 5	
No. of classes required to complete UNIT-II: 16				**No. of classes taken:**		
MID-1(24.08.2026 to 29.08.2026)						

UNIT-III: Finite Markov Decision Processes

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.	The Agent–Environment Interface	2	12-08-2026 14-08-2026		TLM1,2	
2.	Goals and Rewards, Returns	2	17-08-2026 18-08-2026		TLM1,2	
3.	Unified Notation for Episodic and Continuing Tasks	2	19-08-2026 21-08-2026		TLM1,2	
4.	Tutorial Class	1	22-08-2026		TLM 3	
5.	The Markov Property	1	31-08-2026		TLM1,2	
6.	Markov Decision Processes	2	01-09-2026 02-09-2026		TLM1,2, 6	
7.	Value Functions	1	04-09-2026		TLM1,2	
8.	Tutorial Class	1	05-09-2026			
9.	Optimal Value Functions	2	07-09-2026 08-09-2026		TLM1,2	
10.	Optimality and Approximation.	1	09-09-2026		TLM1,2	
11.	**Unit Test-3**	1	11-09-2026		TLM 5	
No. of classes required to complete UNIT-III: 16				**No. of classes taken:**		

UNIT-IV: Monte Carlo Methods

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.	Monte Carlo Prediction	1	15-09-2026		TLM1,2	
2.	Monte Carlo Estimation of Action Values	2	16-09-2026 18-09-2026		TLM1,2	
3.	Monte Carlo Control	1	19-09-2026		TLM1,2	
4.	Tutorial Class	1	21-09-2026		TLM 3	
5.	Monte Carlo Control without Exploring Starts	2	22-09-2026 23-09-2026		TLM1,2	
6.	Off- policy Prediction via Importance Sampling	1	25-09-2026		TLM1,2, 6	
7.	Incremental Implementation	1	26-09-2026		TLM1,2	
8.	Off-Policy Monte Carlo Control	1	28-09-2026		TLM1,2	
9.	Tutorial Class	1	29-09-2026		TLM 3	
10.	Importance Sampling on Truncated Returns.	2	30-09-2026 02-10-2026		TLM1,2	
11.	**Unit Test-4**	1	03-10-2026		TLM 5	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Applications and Case Studies

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.	Applications	2	05-10-2026 06-10-2026		TLM1,2	
2.	Case Studies	2	07-10-2026 09-10-2026		TLM1,2	
3.	TD-Gammon	1	12-10-2026		TLM1,2	
4.	Samuel's Checkers Player	1	13-10-2026		TLM1,2	
5.	The Acrobot	1	14-10-2026		TLM1,2	
6.	Elevator Dispatching	1	16-10-2026		TLM1,2	
7.	Tutorial Class	1	17-10-2026		TLM 3	
8.	Dynamic Channel Allocation	2	26-10-2026 27-10-2026		TLM1,2	
9.	Job-Shop Scheduling.	2	28-10-2026 30-10-2026		TLM1,2	
10.	**Unit Test-V**	1	31-10-2026		TLM5	
No. of classes required to complete UNIT-V: 09				**No. of classes taken:**		
MID-2(02.11.2026 to 07.11.2026)						

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+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

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