LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with'A' Grade& NBA (Under Tier - I)
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, KRISHNA DIST., A.P.-521 230.
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.S. RAMESH
Course Name & Code : Generative AI (23IT10)
L-T-P Structure : 3-0-0 **Credits:**3
Program/Sem/Sec : B.Tech/VII SEM /B **A.Y.:**2025-26
Regulations : R23

PREREQUISITE: Object Oriented Programming

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- Understand the basics of Generative AI.
- Know the basics of Text Generation.
- Understand the process of generating videos.
- Know about GAN and its variants.

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

COs	Course Outcome (CO) Statement	Bloom's Level
CO1	Describe the fundamental concepts, types of generative models (GANs, VAEs), and the ethical challenges associated with Generative AI.	Understand - L2
CO2	Explain the architecture of Large Language Models (BERT, GPT), the mechanics of Transformers, and the principles of Prompt Engineering.	Understand - L2
CO3	Summarize the working principles of image generation techniques including GANs, Variational Auto encoders, and Stable Diffusion models.	Understand - L2
CO4	Recognize the applications of generative models in creative domains such as painting, music, and style transfer, including the role of autonomous agents.	Remember - L1
CO5	Identify open-source models, programming frameworks (Lang Chain, Hugging Face), and strategies for training, fine-tuning, and deploying generative models.	Remember - L1

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

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	-	-	-	3	2	3	-	-	-	1	1	-	-
CO2	3	1	1	1	-	-	-	-	-	1	-	1	1	1	-
CO3	3	1	1	1	-	-	-	-	-	-	-	-	1	1	-
CO4	2	-	-	-	-	3	-	-	1	-	-	-	-	-	-
CO5	2	-	-	-	1	-	-	-	1	-	2	1	-	1	2
Avg	2.6	1	1	1	1	3	2	3	1	1	2	1	1	1	2

TEXTBOOKS:

1. Denis Rothman, "Transformers for Natural Language Processing and Computer Vision", Third Edition, Packt Books, 2024

REFERENCE BOOKS:

1. David Foster," Generative Deep Learning", O'Reily Books, 2024.
2. Altaf Rehmani, "Generative AI for Everyone", Blue Rose One, 2024.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Generative AI

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.	Historical Overview of Generative Modeling	1	29-06-2026		TLM1, 2	
2.	Generative vs. Discriminative Modeling	1	01-07-2026		TLM1, 2	
3.	Importance of Generative Models in AI & Machine Learning	2	02-07-2026 02-07-2026		TLM1, 2	
4.	Types of Generative Models • GANs • VAEs • Autoregressive models • Vector-quantized & Diffusion models	3	03-07-2026 06-07-2026 08-07-2026		TLM1, 2	
5.	Probabilistic Modeling & the Generative Process	1	09-07-2026		TLM1, 2	
6.	Challenges in Generative Modeling	1	09-07-2026		TLM1, 2	
7.	Future of Generative AI	1	10-07-2026		TLM1, 2	
8.	Ethical & Responsible AI	1	13-07-2026		TLM1, 2	
9.	Use Cases Across Industries	2	15-07-2026 16-07-2026		TLM1, 2	
10.	Prompt Engineering **(Activity-Based Learning)**	1	16-07-2026			
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT-II: Generative Models for Text

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.	Basics of Language Modelling • Tokens, embeddings, positional encoding	2	17-07-2026 20-07-2026		TLM1,2	
12.	Transformer Architecture • Encoder / Decoder	2	22-07-2026 23-07-2026		TLM1,2	

	• Attention mechanism					
13.	Text Generation Techniques	2	23-07-2026 24-07-2026		TLM1,2	
14.	Popular Models • BERT • GPT Family (GPT-2 → GPT-4)	2	27-07-2026 29-07-2026		TLM1,2	
15.	Auto encoding & Regression Models	1	30-07-2026		TLM1,2	
16.	Chat GPT: Capabilities & Limitations	1	30-07-2026		TLM1,2	
17.	Prompt Engineering • Prompt design principles • Improving prompts • RLHF (Reinforcement Learning from Human Feedback)	2	31-07-2026 03-08-2026		TLM1,2	
18.	Retrieval-Augmented Generation (RAG)	2	05-08-2026 06-08-2026		TLM1,2	
19.	Multimodal LLMs	1	06-08-2026		TLM1,2	
20.	Common Issues • Hallucination • Bias & safety considerations	2	07-08-2026 10-08-2026		TLM1,2	
21.	AI Content Generation **(Activity-Based Learning)**	1	12-08-2026			
No. of classes required to complete UNIT-II: 18				**No. of classes taken:**		

UNIT-III: Image Generation

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.	Generative Adversarial Networks (GANs) • Architecture • Adversarial Training • Nash Equilibrium in GANs	2	13-08-2026 13-08-2026		TLM1,2	
23.	Variation Auto encoders (VAEs)	2	14-08-2026 17-08-2026		TLM1,2	
24.	Encoder-Decoder Architectures	1	19-08-2026		TLM1,2	
25.	Diffusion & Stable Diffusion Models	2	20-08-2026 20-08-2026		TLM1,2	
26.	Transformer-based Image Generation • CLIP • Vision Transformers (ViT) • DALL-E 2 &DALL-E 3 • GPT-4V	3	21-08-2026 31-08-2026 02-09-2026		TLM1,2	

27.	Challenges • Mode collapse • Stability issues	2	03-09-2026 03-09-2026		TLM1,2	
28.	AI Content Generation **(Activity-Based Learning)**	1	07-09-2026			
No. of classes required to complete UNIT-III: 13				**No. of classes taken:**		

UNIT-IV: Generation of Painting, Music & Play

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
29.	Variants and Types of GANs • Cycle GAN	2	09-09-2026 10-09-2026		TLM1,2	
30.	Applications • Artwork generation • Neural Style Transfer	1	10-09-2026		TLM1,2	
31.	Music Generation • RNN-based models • Muse GAN	1	11-09-2026		TLM1,2	
32.	Reinforcement Learning for Generative Behaviors • Autonomous agents • Deep Q-Networks (DQN)	2	16-09-2026 17-09-2026		TLM1,2	
33.	Actor-Critic architectures	1	17-09-2026		TLM1,2	
34.	AI Ethics Case Study **(Activity-Based Learning)**	1	18-09-2026			
No. of classes required to complete UNIT-IV: 08				**No. of classes taken:**		

UNIT-V: Open-Source Models & Programming Frameworks

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
35.	Training & Fine-Tuning Generative Models	2	21-09-2026 23-09-2026		TLM1,2	
36.	Transfer Learning & Pertained Models	2	24-09-2026 24-09-2026		TLM1,2	
37.	GPT4All & Other Local LLM Tools	2	25-09-2026 30-09-2026		TLM1,2	
38.	Training Vision Models	2	01-10-2026 01-10-2026		TLM1,2	
39.	Programming with Modern Tools • Copilot / Code Assistants • Lang Chain for LLM applications	2	05-10-2026 08-10-2026		TLM1,2	
40.	Open-Source Models • LLaMA family • Other community-driven LLMs	2	08-10-2026 12-10-2026		TLM1,2	
41.	Time S former for Video Generation	2	14-10-2026 15-10-2026		TLM1,2	
42.	Deployment Frameworks	2	15-10-2026		TLM1,2	

	• Hugging Face Hub • Model hosting & inference pipelines		16-10-2026			
43.	AI Resume Builder using LLMs **(Beyond Syllabus Topic)**	1	26-10-2026		TLM1,2	
44.	AI Interview Preparation Assistant **(Beyond Syllabus Topic)** • AI Code Reviewer • AI Story Generator	2	28-10-2026 30-10-2026		TLM1,2	
No. of classes required to complete UNIT-V: 19				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	**Marks**
Assignment-I (Units-I,II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- DescriptiveExamination (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):

PSO1	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO2	Design, Implement and Evaluate a computer-based system to meet desired needs..
PSO3	Develop IT application services with the help of different current engineering tools..

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Mr.S. Ramesh**	**Mr.D. Anil Kumar**	**Dr.Ch. Rajendra Babu**	**Dr.P. Bhagath**
Signature				

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DEPARTMENT OF MASTER OF BUSINESS ADMINISTRATIONS

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. Narasimharao Vallabhu
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	2	2	2	1	1	2	1	2	1	1
CO2	3	2	1	1	1	2	2	2	2	1	2	1	2	1	1
CO3	2	3	2	2	2	2	2	1	2	2	3	2	2	2	1
CO4	2	3	3	2	2	2	2	2	2	2	3	2	2	2	2
CO5	2	3	3	3	2	3	3	3	3	3	3	3	2	3	2
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	1	29-06-2026		TLM1, 2	
2.	Nature & Scope of HRM	1	01-07-2026		TLM1, 2	
3.	Functions of HRM	1	03-07-2026		TLM1, 2	
4.	Role of HR Manager & Emerging Trends	1	06-07-2026		TLM1, 2	
5.	E-HRM & HR Audit Models	1	08-07-2026		TLM1, 2	
6.	Ethical Aspects of HRM & HR Planning	1	10-07-2026		TLM1, 2	
7.	Demand & Supply Forecasting	1	13-07-2026		TLM1, 2	
8.	Job Design	1	15-07-2026		TLM1, 2	
9.	Recruitment & Sources of Recruitment	1	17-07-2026		TLM1, 2	
10.	Selection Procedure	1	20-07-2026		TLM1, 2	
11.	Tutorial / Activity / Assignment	1	22-07-2026		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
12.	HRD Concepts	1	24-07-2026		TLM1,2	
13.	HR Accounting & Models	1	27-07-2026		TLM1,2	
14.	Training – Concept & Need	1	29-07-2026		TLM1,2	
15.	Methods of Training	1	31-07-2026		TLM1,2	
16.	Performance Appraisal – Importance	1	03-08-2026		TLM1,2	
17.	Methods of Performance Appraisal	1	05-08-2026		TLM1,2	
18.	Career Development	1	07-08-2026		TLM1,2	
19.	Counseling	1	10-08-2026		TLM1,2	
20.	Group Interaction	1	12-08-2026		TLM1,2	
21.	HR Applications / Case Study	1	14-08-2026		TLM1,2	
22.	Tutorial / Activity / Assignment	1	17-08-2026		TLM 3/7	
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
23.	Basics of Project Management	1	31-08-2026		TLM1,2	
24.	Resource Management	1	02-09-2026		TLM1,2	
25.	Project Environment	1	07-09-2026		TLM1,2	
26.	Types of Projects	1	09-09-2026		TLM1,2	
27.	Project Networks (DPR)	1	11-09-2026		TLM1,2	
28.	Project Life Cycle	1	16-09-2026		TLM1,2	
29.	Project Proposals & Monitoring Project Progress	1	18-09-2026		TLM1,2	
30.	Project Appraisal & Project Selection	1	21-09-2026		TLM1,2	
31.	80-20 Rule, Production Technology & Communication Matrix	1	23-09-2026		TLM1,2	
32.	Tutorial / Activity / Assignment	1	25-09-2026		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
33.	Different Project Types	1	28-09-2026		TLM1,2	

34.	Management Strategies for Different Project Types	1	30-09-2026		TLM1,2	
35.	Management Challenges in Different Project Types	1	05-10-2026		TLM1,2	
36.	Abandonment Analysis	1	07-10-2026		TLM1,2	
37.	Tutorial / Activity / Assignment	1	09-10-2026		TLM 3/7	
No. of classes required to complete UNIT-IV: 5				**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
38.	Forms of Project Organization	1	12-10-2026			
39.	Project Planning	1	14-10-2026			
40.	Project Control	1	16-10-2026			
41.	Human Aspects of Project Management	1	26-10-2026			
42.	Prerequisites for Successful Project Implementation	1	28-10-2026			
43.	Project Review & Performance Evaluation	1	30-10-2026			
No. of classes required to complete UNIT-V: 6				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PSO1	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO3	Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Mr. Narasimharao Vallabhu**	**Mr. Narasimharao Vallabhu**	**Dr. A. Adisesha Reddy**	**Dr. K. Deepika**
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. J. Nagaraju
Course Name & Code : DevOps & 23IT08
L-T-P Structure : **3-0-0** **Credits:** 3
Program/ Sem /Sec : B.Tech/VII/B **A.Y.:** 2026-27

PREREQUISITES : **Software Engineering, SDLC Models, Cloud Computing, Programming languages.**

Course Objectives: The objectives of this course are to introduce

- Describe the agile relationship between development and IT operations.
- Understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability.
- Implement automated system update and DevOps lifecycle.

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

CO1	Understand the concepts of SDLC Models, features of DevOps, Architecture of DevOps and Life Cycle of DevOps. **(Understand-L2)**
CO2	Apply the source code management tool to maintain the versions of the Source Code repositories. **(Apply-L3)**
CO3	Applying the pipeline tool to build an application and automate a continuous integration (CI) pipeline. **(Apply-L3)**
CO4	Implementing Docker containers to deliver and deploy the application continuously. **(Apply-L3)**
CO5	Deploying an application using Ansible, Kubernetes and OpenShift to automate Container orchestration 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					1			1	1	1	1		1		1
CO2					2				1			1			2
CO3					2							1			2
CO4					2							1			2
CO5					2				1			2			2
1-Low							**2 –Medium**						**3-High**		

Text Books

1. Joyner, Joseph., Devops for Beginners: Devops Software Development Method Guide for Software Developers and It Professionals, 1st Edition Mihails Konoplows, 2015.
2. Alisson Machado de Menezes., Hands-on DevOps with Linux,1st Edition, BPB Publications, India, 2021.

Reference Books

1. LenBass, IngoWeber, LimingZhu.DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10

2. Gene Kim Je Humble, Patrick Debois, John Willis. The DevOps Handbook, 1st Edition, IT Revolution Press, 2016.

3. Verona, Joakim Practical DevOps, 1st Edition, Packt Publishing,2016.

4. Joakim Verona. Practical DevOps, 2nd Edition.Ingramshorttitle; 2nd edition (2018). ISBN10: 1788392574

5. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint.Wiley publications.ISBN:9788126579952

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to DevOps

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 DevOps and COs**	1	29-06-2026		TLM1,2	
2.	**Introduction to SDLC, Agile Model**	1	01-07-2026		TLM1,2	
3.	**Introduction to DevOps.**	1	02-07-2026		TLM1,2	
4.	**Features of DevOps, DevOps Architecture**	1	02-07-2026		TLM1,2	
5.	**DevOps Lifecycle**	1	04-07-2026		TLM1,2	
6.	**Understanding workflow and principles**	1	06-07-2026		TLM1,2	
7.	**Introduction to DevOps Tools**	1	08-07-2026		TLM1,2	
8.	**Build Automation, Delivery Automation**	1	09-07-2026		TLM1,2	
9.	**Understanding Code Quality, Automation of CI/CD**	1	09-07-2026		TLM1,2	
10.	**Release Management, Scrum**	1	11-07-2026		TLM1,2	
11.	**Kanban, Delivery pipeline, bottlenecks Examples**	1	13-07-2026		TLM1,2	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Source Code 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
1.	**Source Code Management, need for source code management, History of Source code management**	1	15-07-2026		TLM1,2	
2.	**source code management system and migrations. What is Version Control and GIT**	1	16-07-2026		TLM1,2	

3.	**GIT Installation, GIT features, GIT workflow**	1	16-07-2026		TLM1,2	
4.	**working with remote repository**	1	18-07-2026		TLM1,2	
5.	**GIT commands, GIT branching**	1	20-07-2026		TLM1,2	
6.	**GIT staging and collaboration**	1	22-07-2026		TLM1,2	
7.	**unit testing-code coverage: Junit**	1	23-07-2026		TLM1,2	
8.	**n Unit& Code Coverage with Sonar Qube**	1	23-07-2026		TLM1,2	
9.	**SonarQube- Code Quality Analysis.**	1	26-07-2026		TLM1,2	
10.	**SonarQube - Code Quality Analysis.**	1	27-07-2026		TLM1,2	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: Build Automation - Continuous Integration (CI)

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.	**Build Automation - Continuous Integration (CI): Build Automation**	2	29-07-2026 30-07-2026		TLM1,2	
2.	**what is CI Why Cl is Required, CI tools**	1	30-07-2026		TLM1,2	
3.	**Introduction to Jenkins (With Architecture)**	1	01-08-2026		TLM1,2	
4.	**Jenkins workflow, Jenkins master slave architecture**	1	03-08-2026		TLM1,2	
5.	**Jenkins Pipelines**	2	05-08-2026 06-08-2026		TLM1,2	
6.	**PIPELINE BASICS - Jenkins Master**	1	06-08-2026		TLM1,2	
7.	**Node, Agent, and Executor Freestyle Projects& Pipelines**	1	08-08-2026		TLM1,2	
8.	**Jenkins for Continuous Integration**	1	10-08-2026		TLM1,2	
9.	**Create and Manage Builds**	2	12-08-2026 13-08-2026		TLM1,2	
10.	**User Management in Jenkins Schedule Builds**	1	17-08-2026		TLM1,2	
11.	**Launch Builds on Slave Nodes**	1	19-08-2026		TLM1,2	
No. of classes required to complete UNIT-III: 13				**No. of classes taken:**		

UNIT-IV: Continuous Delivery

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.	**Importance of Continuous Delivery, continuous deployment cd Flow**	1	20-08-2026		TLM1,2	
2.	**Containerization with Docker: Introduction to Docker**	1	20-08-2026		TLM1,2	
3.	**Docker installation, Docker commands**	2	22-08-2026 31-08-2026		TLM1,2	
4.	**Images & Containers**	1	02-09-2026		TLM1,2	
5.	**Docker File**	1	03-09-2026		TLM1,2	
6.	**running containers**	1	03-09-2026		TLM1,2	
7.	**working with containers and publish to Docker Hub**	2	05-09-2026		TLM1,2	
8.	**Testing Tools: Introduction to Selenium and its features**	1	07-09-2026 10-09-2026		TLM1,2	
9.	**Java Script testing.**	2	10-09-2026		TLM1,2	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Configuration Management & Containerization

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 Ansible**	1	12-09-2026		TLM1,2	
2.	**Ansible tasks Roles**	2	15-09-2026		TLM1,2	
3.	**Jinja2 templating, Vaults**	1	17-09-2026		TLM1,2	
4.	**Deployments using Ansible**	1	17-09-2026		TLM1,2	
5.	**Introduction to Kubernetes**	2	19-09-2026		TLM1,2	
6.	**Namespace& Resources**	2	21-09-2026 23-09-2026		TLM1,2	
7.	**CI/CD - On OCP**	1	24-09-2026		TLM1,2	
8.	**BC, DC & ConfigMaps**	2	24-09-2026 26-09-2026		TLM1,2	
9.	**Deploying Apps on OpenShift Container Pods**	1	28-09-2026 30-09-2026		TLM1,2	
10.	**Introduction to Puppet master and Chef**	1	01-10-2026 01-10-2026		TLM1,2	
No. of classes required to complete UNIT-V: 14				**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.	**Argo CD**	2	03-10-2026 05-10-2026		TLM1,2	
2.	**Infrastructure as Code**	2	07-10-2026 08-10-2026		TLM1,2	
3.	**AIOps, MLOps**	1	10-10-2026 12-10-2026		TLM1,2	

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

PART-C

I MID EXAMINATIONS (24-08-2026 TO 29-08-2026)
II MID EXAMINATIONS (02-11-2026 TO 07-11-2026)

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr.J.Nagaraju**	**Mrs. B. Usa Rani**	**Dr.B.Phani Krishna**	**Dr. P. Bhagath**
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT
PART-A

Name of Course Instructor : K. SUDHAKAR
Course Name & Code : Big Data Analytics Lab, 23AD14
L-T-P Structure : **3-0-0**
Credits : 3
Program/Sem/Sec : B.Tech /VII/B
A.Y. : 2026-27

Pre-requisites: - Python Programming and Machine Learning

Course Educational Objectives (CEOs):

The main objectives of the course are to:

- Understand the importance of explainability in AI and its impact on stakeholders.
- Explore different techniques and methods for making AI systems explainable.
- Analyse the trade-offs between model complexity and interpretability.
- Examine the ethical and societal implications of XAI.
- Apply XAI techniques to real-world datasets and scenarios.

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

CO	Course Outcome Statement	Bloom's Level
CO1	Understand the fundamental motivations for XAI and differentiate between model-specific and model-agnostic interpretability techniques.	Understanding (L2)
CO2	Analyse the architectural transparency of interpretable models, including sparse neural networks and attention mechanisms.	Understanding (L2)
CO3	Apply advanced XAI methods such as SHAP, LIME, and Saliency Maps to provide explanations for non-linear and deep learning models.	Applying (L3)
CO4	Evaluate the performance of XAI techniques using quantitative metrics while addressing ethical biases and regulatory fairness.	Understanding (L2)
CO5	Design explainable AI solutions for practical applications in healthcare, finance, and autonomous systems.	Applying (L3)

Program Educational Objectives (PEOs):

- **PEO 1:** Graduates will apply technical knowledge in AI and Data Science to develop transparent and interpretable solutions for complex engineering problems.
- **PEO 2:** Graduates will demonstrate professional ethics and social responsibility by ensuring AI systems are fair, accountable, and trustworthy.
- **PEO 3:** Graduates will engage in lifelong learning to stay updated with evolving XAI methodologies and regulatory considerations.

COURSE ARTICULATION MATRIX (CO-PO Mapping):

Correlation between COs, POs & PSOs (1 - Low, 2 - Medium, 3 - High):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	2	-	1	-	-	-	2	-	-
CO2	2	2	-	-	1	-	-	-	-	-	-	2	-	-
CO3	3	2	2	2	2	-	-	-	-	-	-	3	2	1
CO4	1	1	-	-	-	3	2	3	-	-	-	1	-	3
CO5	2	2	1	2	3	-	-	-	-	-	-	3	3	2
CO6	2	1	-	-	-	2	-	1	-	-	-	2	-	-

Syllabus

UNIT I: Introduction to Explainable AI (XAI)

Motivations for XAI, Importance of interpretability and transparency. Techniques for XAI: Model-specific interpretability methods (e.g., decision trees, rule-based systems), Model-agnostic interpretability methods (e.g., LIME, SHAP), Post-hoc explanation techniques (e.g., feature importance, counterfactual explanation).

UNIT II: Interpretable Models

Linear models, Decision trees and rule-based systems, Symbolic AI approaches, Interpretable Neural Networks, Sparse neural networks, Attention mechanisms, Layer-wise relevance propagation (LRP).

UNIT III: Methods for Explainable AI

Partial Dependence Plot (PDP), Conformal Prediction, Individual Conditional Expectation (ICE), Feature Importance, Saliency Maps, Local Interpretable Model-Agnostic Explanations (LIME), SHAP, Integrated Gradient (IG), Explainability for Linear Models, Non-linear models and Deep Learning Models.

UNIT IV: Evaluation of XAI Methods

Quantitative metrics for interpretability, Human-centric evaluation methods, Ethical and Societal Implications of XAI, Bias and fairness in interpretable AI, Trust and accountability in AI systems, Regulatory considerations.

UNIT V: Applications of XAI

Healthcare (medical diagnosis, personalized treatment), Finance (credit scoring, fraud detection), Autonomous systems (self-driving cars, drones). Explainability in Time Series Forecasting, Natural Language Processing, and Computer Vision.

Textbooks:

1. "Interpretable Machine Learning" by Christoph Molnar.
2. "Explainable AI: Interpreting, Explaining and Visualizing Deep Learning" by L. Liu and G. Hu.

Reference Books:

1. "Interpretable Machine Learning: A Guide for Making Black Box Models Explainable" by Christoph Molnar
2. "Explainable AI: Interpreting, Explaining and Visualizing Deep Learning" by L. Liu and G. Hu –

3. "Explainable AI in Healthcare: Exploring Interpretable Models and Learning from Patient Data" edited by F. E. Elsayed and B. G. Stoecklin

Online Resources:

1. https://christophm.github.io/interpretable-ml-book/

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

S. No	Name	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign
UNIT I – Introduction to Explainable AI (XAI)						
1	Course overview, objectives & Motivations for XAI	1	30.06.2026	TLM1, TLM2		
2	Importance of interpretability and transparency	1	01.07.2026	TLM1, TLM2		
3	Techniques for XAI – overview and taxonomy	1	02.07.2026	TLM2		
4	Model-specific interpretability methods: Decision trees	1	03.07.2026	TLM1, TLM4		
5	Model-specific interpretability methods: Rule-based systems	1	07.07.2026	TLM1		
6	Model-agnostic interpretability methods: LIME	1	08.07.2026	TLM2, TLM4		
7	Model-agnostic	2	09.07.2026,	TLM2, TLM4		

	interpretability methods: SHAP		10.07.2026			
8	Post-hoc explanation: Feature importance	1	14.07.2026	TLM1, TLM2		
9	Post-hoc explanation: Counterfactual explanations	1	15.07.2026	TLM1		
10	Tutorial / Problem solving on Unit I	1	16.07.2026	TLM3		
11	NPTEL/MOOC session & Unit I revision	1	17.07.2026	TLM5		
UNIT II – Interpretable Models						
12	Linear models for interpretability	1	21.07.2026	TLM1, TLM2		
13	Decision trees and rule-based systems	1	22.07.2026	TLM1		
14	Symbolic AI approaches	1	23.07.2026	TLM1, TLM2		
15	Interpretable Neural Networks	1	24.07.2026	TLM2		
16	Sparse neural networks	1	28.07.2026	TLM2		
17	Attention mechanisms	1	29.07.2026	TLM2, TLM4		
18	Layer-wise Relevance	1	30.07.2026	TLM2		

	Propagation (LRP)					
19	Tutorial / Group discussion on Unit II	1	31.07.2026	TLM3, TLM6		
20	NPTEL/MOOC session & Unit II revision	1	04.08.2026	TLM5		
21	Internal Assessment Test – I (Units I & II)	1	05.08.2026	TLM3		
UNIT III – Methods for Explainable AI						
22	Partial Dependence Plot (PDP)	1	06.08.2026	TLM1, TLM2		
23	Conformal Prediction	1	07.08.2026	TLM1		
24	Individual Conditional Expectation (ICE)	1	11.08.2026	TLM1, TLM2		
25	Feature Importance	1	12.08.2026	TLM2		
26	Saliency Maps	1	13.08.2026	TLM2, TLM4		
27	LIME – deep dive & demonstration	1	14.08.2026	TLM2, TLM4		
28	SHAP – deep dive & demonstration	1	18.08.2026	TLM2, TLM4		
29	Integrated Gradients (IG)	1	19.08.2026	TLM2		

30	Explainability for Linear Models	1	20.08.2026	TLM1		
31	Explainability for Non-linear Models	1	21.08.2026	TLM1, TLM2		
32	Explainability for Deep Learning Models	2	01.09.2026, 02.09.2026	TLM2, TLM4		
33	Tutorial / Problem solving on Unit III	1	03.09.2026	TLM3		
34	NPTEL/MOOC session & Unit III revision	1	04.09.2026	TLM5		
UNIT IV – Evaluation of XAI Methods						
35	Quantitative metrics for interpretability	1	08.09.2026	TLM1, TLM2		
36	Human-centric evaluation methods	1	09.09.2026	TLM1, TLM2		
37	Ethical and societal implications of XAI	1	10.09.2026	TLM1, TLM6		
38	Bias and fairness in interpretable AI	1	11.09.2026	TLM2, TLM6		
39	Trust and accountability in AI systems	1	15.09.2026	TLM1		

40	Regulatory considerations (GDPR, ECOA, SR 11-7)	1	16.09.2026	TLM2		
41	Group discussion / case study on ethics & fairness	1	17.09.2026	TLM6		
42	Tutorial, NPTEL/MOOC & Unit IV revision	1	18.09.2026	TLM3, TLM5		
43	Internal Assessment Test – II (Units III & IV)	1	22.09.2026	TLM3		
UNIT V – Applications of XAI						
44	Healthcare: Medical diagnosis	1	23.09.2026	TLM2, TLM4		
45	Healthcare: Personalized treatment	1	24.09.2026	TLM2		
46	Finance: Credit scoring	1	25.09.2026	TLM1, TLM2		
47	Finance: Fraud detection	1	29.09.2026	TLM2		
48	Autonomous systems: Self-driving cars	1	30.09.2026	TLM2, TLM4		
49	Autonomous systems: Drones	1	01.10.2026	TLM2		
50	Explainability	1	06.10.2026	TLM1, TLM2		

	in Time Series Forecasting					
51	Explainability in Natural Language Processing	1	07.10.2026	TLM2, TLM4		
52	Explainability in Computer Vision	1	08.10.2026	TLM2, TLM4		
53	Mini-project / Group project presentations	1	09.10.2026	TLM6		
54	Tutorial, NPTEL/MOOC & Unit V revision	1	13.10.2026	TLM3, TLM5		
REVISION & INTERNAL ASSESSMENTS						
55	Comprehensive revision: Units I & II	1	14.10.2026	TLM1		
56	Comprehensive revision: Units III, IV & V	1	15.10.2026	TLM1		
57	Previous question papers discussion	1	16.10.2026	TLM3		
58	Internal Assessment Test – III / Final revision	1	27.10.2026	TLM3		
Total Number of Classes Planned		**60**				

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 (R23Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO No.	PO Statement
PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.
PO2	**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.
PO3	**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 public health and safety, and the cultural, societal, and environmental considerations.
PO4	**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.
PO5	**Engineering Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling recognizing their limitations to solve complex engineering problems.

PO6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment.
PO7	**Ethics:** Apply ethical principles and commitment to professional ethics and responsibilities and norms of engineering practice.
PO8	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO9	**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, making effective presentations, and give and receiving clear instructions.
PO10	**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.
PO11	**Life-Long Learning:** Recognize the need for and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking 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**
Faculty Name	**K. Sudhakar**	**K. Sudhakar**	**Dr. Ch. Rajendra Babu**	**Dr. P. Bhagath**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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L.B. REDDY NAGAR, MYLAVARAM, N.T.R. DIST., A.P.-521 230.

Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. K. HARISH KUMAR
Course Name & Code : DISASTER MANAGEMENT& 23CE81
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., AI&DS/VII-Sem/B., A.Y : 2026-27

PRE-REQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course deals with different types of disasters, impacts of disasters, importance of technology in handling disaster management situations, importance of planning and risk prevention in case of occurrence of disaster, importance of education and community approach for the responsive actions to be taken in case of occurrence of disaster.

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

CO 1	Identify the usefulness of integrating management principles in disaster mitigation work **(Understand-L2).**
CO 2	Illustrate the different approaches needed to manage pre- during and post- disaster periods **(Understand-L2).**
CO 3	Identify and explain the process of risk management **(Understand-L2).**
CO 4	Evaluate the risk transfer Relate to importance of education and community approach for the responsive actions to be taken in case of disaster occurrence **(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	1	1	-	1	2	1	-	-	-	-	-	1	2	1	2
CO2	1	1	1	2	2	1	-	-	-	-	-	1	2	1	2
CO3	1	-	-	1	2	1	1	1	-	-	-	1	1	1	2
CO4	1	-	-	1	1	1	1	1	1	1	1	1	1	1	2

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

TEXT BOOKS:

T1 An Introduction of Disaster Management- Natural Disasters & Vulnerable Hazards– S. Vaidyanathan: CBS Publishers& Distributors Pvt.Ltd.

T2 Natural Hazards & Disaster Management, Vulnerability and Mitigation by RB Singh-Rawat Publications

T3 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

T4 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt.Ltd.

REFERENCE BOOKS:

R1 'Disaster Management' edited by H K Gupta (2003), Universities press.

R2 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy (2009), Universities press.R. Nishith, Singh AK

R3 "Disaster Management in India: Perspectives, Issues and strategies" New Royal Book Company."

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Natural Hazards and Disaster 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
1.	Introduction CO's & PO's, Subject	1	29/06/2026		**TLM2**	
2.	**Natural Hazards and Disaster Management**: Introduction of DM	1	30/06/2026		**TLM2**	
3.	Inter disciplinary nature of the subject	1	01/07/2026		**TLM2**	
4.	Disaster Management cycle	1	03/07/2026		**TLM2**	
5.	Five priorities for action	1	06/07/2026		**TLM2**	
6.	Case study methods - Vegetal Cover floods	1	07/07/2026		**TLM2**	
7.	Case study methods - Droughts	1	08/07/2026		**TLM2**	
8.	Case study methods - Earthquakes - landslides	1	10/07/2026		**TLM2**	
9.	Case study methods - Global warming - Cyclones	1	13/07/2026		**TLM2**	
10.	Case study methods - Tsunamis – Post Tsunami hazards along the Indian coast.	1	14/07/2026		**TLM2**	
11.	Revision	1	15/07/2026		**TLM2**	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Man Made Disaster and Their Management Along with Case Study Methods of the Following

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.	**Man Made Disaster - Intro**	1	17/07/2026		**TLM2**	
13.	Man Made Disaster and Their Management	1	20/07/2026		**TLM2**	
14.	Case study methods - Fire hazards	1	21/07/2026		**TLM2**	
15.	Case study methods - transport hazard dynamics	1	22/07/2026		**TLM2**	
16.	Case study methods - solid waste management	1	24/07/2026		**TLM2**	
17.	Case study methods - post disaster	1	27/07/2026		**TLM2**	
18.	Case study methods - bio terrorism - threat in mega cities	1	28/07/2026		**TLM2**	
19.	Case study methods - rail and aircraft accidents	1	29/07/2026		**TLM2**	
20.	Case study methods - ground water, industries	1	31/07/2026		**TLM2**	
21.	Emerging infectious diseases	1	03/08/2026		**TLM2**	
22.	Aids and their management	1	04/08/2026		**TLM2**	
23.	Revision	1	05/08/2026		**TLM2**	
No. of classes required to complete UNIT-II: 12				**No. of classes taken:**		

UNIT-III: Risk and Vulnerability

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	**Risk and Vulnerability**: Intro	1	07/08/2026		**TLM2**	
25.	Building codes	1	10/08/2026		**TLM2**	
26.	Land use planning	1	11/08/2026		**TLM2**	
27.	Social Vulnerability	1	12/08/2026		**TLM2**	
28.	Environmental vulnerability	1	14/08/2026		**TLM2**	
29.	Macro-economic management	1	17/08/2026		**TLM2**	
30.	Sustainable development	1	18/08/2026		**TLM2**	
31.	Climate change risk rendition	1	19/08/2026		**TLM2**	
32.	Financial management of disaster – related losses	1	21/08/2026		**TLM2**	
33.	Revision	1	31/08/2026		**TLM2**	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV: Role of Technology in Disaster Managements

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.	**Role of Technology in Disaster Managements**: Intro	1	01/09/2026		**TLM2**	
35.	Disaster management for infra structures, taxonomy of infra structure	1	02/09/2026			
36.	treatment plants and process facilities	1	07/09/2026		**TLM2**	
37.	electrical substations	1	08/09/2026		**TLM2**	
38.	roads and bridges	1	09/09/2026		**TLM2**	
39.	mitigation programme for earth quakes	1	11/09/2026			
40.	geospatial information in agriculture drought assessment	1	15/09/2026		**TLM2**	
41.	Multimedia Technology in disaster risk management and training	1	16/09/2026		**TLM2**	
42.	Transformable Indigenous Knowledge in disaster reduction	1	18/09/2026		**TLM2**	
43.	Role of RS & GIS	1	21/09/2026		**TLM2**	
44.	Revision	1	22/09/2026		**TLM2**	
No. of classes required to complete UNIT-IV:09				**No. of classes taken:**		

UNIT-V: Multi-sectional Issues, Education and Community Preparedness

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
45.	**Multi-sectional Issues, Education and Community Preparedness** - Intro	1	23/09/2026		**TLM2**	
46.	Impact of disaster on poverty and deprivation	1	25/09/2026		**TLM2**	
47.	Climate change adaptation and human health	1	28/09/2026		**TLM2**	
48.	Exposure, health hazards and environmental risk	1	29/09/2026		**TLM2**	
49.	Forest management and disaster risk reduction	1	30/09/2026		**TLM2**	
50.	The Red cross and red crescent movement	1	05/10/2026		**TLM2**	

51.	Corporate sector and disaster risk reduction	1	06/10/2026		**TLM2**	
52.	Education in disaster risk reduction- Essentials of school disaster education	1	07/10/2026		**TLM2**	
53.	Community capacity and disaster resilience	1	09/10/2026		**TLM2**	
54.	Community based disaster recovery	1	12/10/2026		**TLM2**	
55.	Community based disaster management and social capital	1	13/10/2026		**TLM2**	
56.	Designing resilience	1	14/10/2026		**TLM2**	
57.	Building community capacity for action	1	16/10/2026		**TLM2**	
58.	Revision	1	26/10/2026		**TLM2**	
59.	Revision – unit 1&2(Overview)	1	27/10/2026		**TLM2**	
60.	Revision – unit 3&4(Overview)	1	28/10/2026		**TLM2**	
61.	Class Test	1	30/10/2026		**TLM3**	
No. of classes required to complete UNIT-V: 17				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=15
I-Objective Examination (Units-I & II)	O1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=15
II-Objective Examination (Units-III, IV & V)	O2=10
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =80% of Max(M1,M2)+20% of Min(M1,M2)	M=15
Objective Marks =80% of Max(O1,O2)+20% of Min(O1,O2)	O=10
Cumulative Internal Examination (CIE): A+M+O	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO No.	PO Statement
PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. (WK1 to WK4)
PO2	**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. (WK1 to WK4)
PO3	**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. (WK5)
PO4	**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. (WK8)
PO5	**Engineering Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 to WK6)
PO6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. (WK9)
PO8	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO9	**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.
PO10	**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.
PO11	**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Knowledge and Attitude Profile (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behaviour and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyse and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Title	**Course Instructor**	**Course Coordinator**	**Head of the Department**
Name of the Faculty	**K. Harish Kumar**	**Dr. C. RAJAMALLU**	**Dr. K.V.RAMANA**
Signature			

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC with 'A' Grade, ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

PROGRAM : B.Tech. VII-Sem
ACADEMIC YEAR : 2026-27
COURSE NAME & CODE : Prompt Engineering (23AMS1)
L-T-P STRUCTURE : 0-1-2
COURSE CREDITS : 2
COURSE INSTRUCTOR : M. Kishore Kumar

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 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):

COs	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 LAB SCHEDULE (LESSON PLAN): Section-B

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	Definition of prompt engineering, Distinction between prompt engineering and model fine-tuning, Motivation and benefits of prompt engineering,	1	01/07/2026		TLM8 TLM5	
2	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.	2	04/07/2026		TLM8 TLM5	
3	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	08/07/2026		TLM8 TLM5	
4	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.	2	11/07/2026		TLM8 TLM5	
5	Enhanced prompt anatomy: contextual detail and explicit output specifications, Few-shot in-context prompting, Prompt structuring and template design	1	15/07/2026		TLM8 TLM5	

6	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.	2	18/07/2026		TLM8 TLM5	
7	Role-based prompting to establish personas or system behavior, Negative prompting to filter or suppress undesired content	1	22/07/2026		TLM8 TLM5	
8	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.	2	25/07/2026		TLM8 TLM5	
9	Constraint specification and instruction enforcement (e.g., length, format), Iterative prompt refinement and optimization	1	29/07/2026		TLM8 TLM5	
10	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.	2	01/08/2026		TLM8 TLM5	
11	Importance of structured outputs for real-world applications, Prompting for specific formats (lists, tables, Markdown),	1	05/08/2026		TLM8 TLM5	
12	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.	2	08/08/2026		TLM8 TLM5	
13	Generating valid JSON and YAML via explicit instructions	1	12/08/2026		TLM8 TLM5	
14	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	2	22/08/2026		TLM8 TLM5	

	syntax and refine the prompt if errors occur.					
15	Eliciting chain-of-thought reasoning in zero-shot prompts, Decomposing complex tasks into manageable sub-tasks	1	02/09/2026		TLM8 TLM5	
16	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.	2	05/09/2026		TLM8 TLM5	
17	Limitations of LLM internal knowledge, Need for external data sources, Introduction to Retrieval Augmented Generation (RAG)	1	09/09/2026		TLM8 TLM5	
18	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.	2	12/09/2026		TLM8 TLM5	
19	Overview of RAG architecture (indexing vs. retrieval + generation), Getting started with LangChain for LLM applications,	1	16/09/2026		TLM8 TLM5	
20	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.	2	19/09/2026		TLM8 TLM5	
21	Basics of LangChain Expression Language (LCEL), Simplified indexing pipeline: document loading & text splitting	1	23/09/2026		TLM8 TLM5	
22	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	2	26/09/2026		TLM8 TLM5	
23	Fundamentals of embeddings and vector stores, Building a basic retrieval generation pipeline with an LCEL chain	1	30/09/2026		TLM8 TLM5	
24	Constructing & Running a Basic RAG Chain: Build a pipeline that:	2	03/10/2026		TLM8 TLM5	

	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					
25	Introduction to LLM agents and their basic architecture, Overview of multimodal AI models (VLMs),	1	07/10/2026		TLM8 TLM5	
26	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.	2	10/10/2026		TLM8 TLM5	
27	Prompting for text-to image generation and image understanding, Importance of prompt evaluation beyond subjective judgment	1	14/10/2026		TLM8 TLM5	
28	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.	2	17/10/2026		TLM8 TLM5	
29	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	28/10/2026		TLM8 TLM5	
30	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.	2	31/10/2026		TLM8 TLM5	
31	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	28/10/2026		TLM8 TLM5	
32	Prompt Evaluation & Ethics Workshop: a. Select two existing prompts and generate multiple	2	31/10/2026		TLM8 TLM5	

	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.					

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 (R20 Regulations):

According to Academic Regulations of R20 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	10
Internal Test	10
Total	30

(b) Semester End Examinations (SEE): The Semester End examinations (SEE) for laboratory courses shall be jointly conducted by internal and external examiners with 3 hours duration and evaluated for 35 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	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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. M. Kishore Kumar	**Dr. K.V. Panduranga Rao**	**Dr. Ch. Rajendra Babu**	**Dr. P. Bhagath**

LAKIREDDYBALI REDDYCOLLEGE OFENGINEERING

(AUTONOMOUS)
AccreditedbyNAAC,ISO9001:2015CertifiedInstitutionApprovedbyAICTE,NewDelhi.andAffiliatedtoJNTUK,Kakinada
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DEPARTMENTOFARTIFICIALINTELLIGENCE&DATASCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor	**:** Dr. Ch. Rajendra Babu	
Course Name & Code	**:** Constitution of India (Audit Course) -23MC05	
Regulation	: R23	
L-T-P Structure	**:** 2-0-0	**Credits:** 00
Program/Sem/Sec	: B.Tech – VII Semester – B Section	**A.Y.:** 2026-27

PREREQUISITE: None

COURSE OBJECTIVES: The main objectives of the course are to

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

COURSE OUTCOMES (COs): Upon successful completion of this course, the student should 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. **(Remember-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):

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

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:

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

Online Learning Resources:

https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_lw09

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Constitution of India (Audit Course) -23MC05

UNIT-I: History of Making of the Indian Constitution

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.	Discussion of CO'S and CEO'S	1	29/06/2026		TLM1 & 2	
2.	History	1	30/06/2026		TLM1 & 2	
3.	Drafting Committee, (Composition & Working)	2	06/07/2026 07/07/2026		TLM1 & 2	
4.	Philosophy of the Indian Constitution-Preamble	1	13/07/2026		TLM1 & 2	
5.	Salient Features	1	14/07/2026		TLM1 & 2	
No. of classes required to complete UNIT-I: 06				**No. of classes taken:**		

UNIT-II: Contours of Constitutional Rights & Duties

S No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
6.	Fundamental Rights, Right to Equality	1	20/07/2026		TLM1 & 2	
7.	Right to Freedom, Right against Exploitation	1	21/07/2026		TLM1 & 2	
8.	Right to Freedom of Religion, Cultural and Educational Rights	1	27/07/2026		TLM1 & 2	
9.	Right to Constitutional Remedies	1	28/07/2026		TLM1 & 2	
10.	Directive Principles of State Policy	1	03/08/2026		TLM1 & 2	
11.	Fundamental Duties	1	04/08/2026		TLM1 & 2	
No. of classes required to complete UNIT-II: 06				**No. of classes taken:**		

UNIT-III: Organs of Governance

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.	Parliament, Composition, Qualifications and Disqualifications	1	10/08/2026		TLM1 & 2	
13.	Powers and Functions	1	11/08/2026		TLM1 & 2	
14.	Executive- President, Governor	1	17/08/2026		TLM1 & 2	
15.	Council of Ministers, Judiciary	1	18/08/2026		TLM1 & 2	
16.	Appointment and Transfer of Judges	1	31/08/2026		TLM1 & 2	

17.	Qualifications, Powers and Functions	1	01/09/2026		TLM1 & 2	
No. of classes required to complete UNIT-III: 06				**No. of classes taken:**		

UNIT-IV: Local Administration

S No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18.	District's Administration head: Role and Importance,	1	07/09/2026		TLM1 & 2	
19.	Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation	1	08/09/2026		TLM1 & 2	
20.	Panchayati raj: Introduction, PRI: Zila Panchayat, Elected officials and their roles	1	15/09/2026		TLM1 & 2	
21.	CEO Zila Pachayat: Position and role	1	21/09/2026		TLM1 & 2	
22.	Block level: Organizational Hierarchy (Different departments)	1	22/09/2026		TLM1 & 2	
23.	Village level: Role of Elected and Appointed officials	1	28/09/2026		TLM1 & 2	
24.	Importance of grass root democracy	1	29/09/2026		TLM1 & 2	
No. of classes required to complete UNIT-IV: 07				**No. of classes taken:**		

UNIT-V: Election Commission

S No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
25.	Election Commission: Role and Functioning	1	05/10/2026		TLM1 & 2	
26.	Chief Election Commissioner and Election Commissioners	1	06/10/2026		TLM1 & 2	
27.	State Election Commission: Role and Functioning	1	12/10/2026		TLM1 & 2	
28.	Institute and Bodies for the welfare of SC	1	13/10/2026		TLM1 & 2	
29.	Bodies for the welfare ST	1	26/10/2026		TLM1 & 2	
30.	Bodies for the welfare OBC and women	1	27/10/2026		TLM1 & 2	
No. of classes required to complete UNIT-V: 06				**No. of classes taken:**		

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

PART-B

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	**Marks**
Internal Examination	30
Total Marks:	**30**

ACADEMIC CALENDAR

Commencement of VII Semester Class Work	29-06-2026		
Description	**From**	**To**	**Weeks**
I Phase of Instructions	29-06-2026	22-08-2026	8W
I Mid Examinations	**24-08-2026**	**29-08-2026**	**1 W**
II Phase of Instructions	31-08-2026	17-10-2026	7 W
Dussehra Holidays	19-10-2026	24-10-2026	1W
II Phase of Instructions Contd..	26-10-2026	31-10-2026	1W
II Mid Examinations	**02-11-2026**	**07-11-2026**	**1 W**
Preparation and Practicals	09-11-2026	14-11-2026	1 W
Semester End Examinations	**16-11-2026**	**28-11-2026**	2 W
Commencement of VIII Semester Class Work	**30 –11–2026**		

PART-C

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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.
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Course Instructors	Course Coordinator	Module Coordinator	HoD
Dr. Ch. Rajendra Babu	**Dr. Ch. Rajendra Babu**	**Dr. Ch. Rajendra Babu**	**Dr. P. Bhagath**