



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

Accredited by NAAC with "A" Grade & NBA for ASE, CE, CSE, ECE, EEE, ME & IT (Under Tier - I)

An ISO 21001:2018, 14001:2015, 50001:2018 Certified Institution

Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada

L.B. Reddy Nagar, Mylavaram, NTR Dist., Andhra Pradesh-521 230.

Phone: 08659-222933, Fax: 08659-222931

FRESHMAN ENGINEERING DEPARTMENT

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COURSE HANDOUT

Part-A

PROGRAM	: I B. Tech., II-Sem., ME
ACADEMIC YEAR	: 2025-26
COURSE NAME & CODE	: Differential Equations & Vector Calculus
L-T-P STRUCTURE	: 3-0-0
COURSE CREDITS	: 3
COURSE INSTRUCTOR	: Dr. K.R. Kavitha
COURSE COORDINATOR	: Dr. K. Jhansi Rani
PRE-REQUISITES	: Basics of Vectors, Differentiation, Integration

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To enlighten the learners in the concept of differential equations and multivariable calculus
- To furnish the learners with basic concepts and techniques at intermediate level to lead them into advanced level by handling various real-world applications.

COURSE OUTCOMES (COs)

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

- CO1: Solve the differential equations related to various engineering fields – L3
- CO2: Apply knowledge of partial differentiation in modeling and solving of Partial differential equations – L3
- CO3: Interpret the physical meaning of different operators such as gradient, curl and divergence – L3
- CO4: Evaluate the work done against a field, circulation and flux using Vector Calculus – L3

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

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	1
CO2	3	1	-	-	-	-	-	-	-	-	-	1
CO3	3	2	-	-	-	-	-	-	-	-	-	1
CO4	3	2	-	-	-	-	-	-	-	-	-	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).

BOS APPROVED TEXT BOOKS:

- T1 Dr. B.S. Grewal, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Delhi, 2017.
- T2 Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, John Wiley & sons, New Delhi, 2018.

BOS APPROVED REFERENCE BOOKS:

- R1 George B. Thomas, Maurice D. Weir and Joel Hass, "Thomas Calculus", 14th Edition, Pearson Publishers, 2018.
- R2 Dennis G. Zill and Warren S. Jones and Bartlett, "Advanced Engineering Mathematics", 2018.

R3 Glyn James, “Advanced Modern Engineering Mathematics”, 5th Edition, Pearson Publishers, 2018.

R4 R.K. Jain and S.R.K. Iyengar, “Advanced Engineering Mathematics”, 5th Edition (9th reprint), Alpha Science International Ltd., 2021.

R5 B. V. Ramana, “Higher Engineering Mathematics”, 3rd Edition McGraw Hill Education, 2017.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the course	1	02/02/2026		TLM2			
2.	Course Outcomes, Program Outcomes	1	04/02/2026		TLM2			

UNIT-I: Differential Equations of first order and first degree

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
3.	Introduction to UNIT I	1	05/02/2026		TLM1	CO1	T1,T2	
4.	Linear Differential equation	1	06/02/2026		TLM1	CO1	T1,T2	
5.	Bernoulli’s DE	1	07/02/2026		TLM1	CO1	T1,T2	
6.	Exact DE	1	09/02/2026		TLM1	CO1	T1,T2	
7.	Exact DE	1	11/02/2026		TLM1	CO1	T1,T2	
8.	Non-exact DE Type I	1	12/02/2026		TLM1	CO1	T1,T2	
9.	Non-exact DE Type II	1	13/02/2026		TLM1	CO1	T1,T2	
10.	Non-exact DE Type III	1	14/02/2026		TLM1	CO1	T1,T2	
11.	Non-exact DE Type IV	1	16/02/2026		TLM1	CO1	T1,T2	
12.	TUTORIAL - 1	1	18/02/2026		TLM3	CO1	T1,T2	
13.	Newton’s Law of cooling	1	19/02/2026		TLM1	CO1	T1,T2	
14.	Law of natural growth and decay	1	20/02/2026		TLM1	CO1	T1,T2	
15.	Electrical circuits	1	21/02/2026		TLM1	CO1	T1,T2	
16.	TUTORIAL - 2	1	25/02/2026		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-I		14			No. of classes taken:			

UNIT-II: Linear Differential equations of higher order (Constant Coefficients)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
17.	Introduction to UNIT II	1	23/02/2026		TLM1	CO1	T1,T2	
18.	Solving a homogeneous DE	1	26/02/2026		TLM1	CO1	T1,T2	
19.	Finding Particular Integral, P.I for e^{ax+b}	1	27/02/2026		TLM1	CO1	T1,T2	
20.	P.I for Cos bx, or sin bx	1	28/02/2026		TLM1	CO1	T1,T2	
21.	P.I for polynomial function	1	02/03/2026		TLM1	CO1	T1,T2	
22.	TUTORIAL - 3	1	04/03/2026		TLM3	CO1	T1,T2	

23.	P.I for $e^{ax+b}v(x)$	1	05/03/2026		TLM1	CO1	T1,T2	
24.	P.I for $x^k v(x)$	1	06/03/2026		TLM1	CO1	T1,T2	
25.	Method of Variation of parameters	1	07/03/2026		TLM1	CO1	T1,T2	
26.	Method of Variation of parameters	1	09/03/2026		TLM1	CO1	T1,T2	
27.	TUTORIAL - 4	1	11/03/2026		TLM3	CO1	T1,T2	
28.	Simultaneous linear equations	1	12/03/2026		TLM1	CO1	T1,T2	
29.	L-C-R circuits	1	13/03/2026		TLM1	CO1	T1,T2	
30.	Simple Harmonic motion	1	16/03/2026		TLM1	CO1	T1,T2	
31.	TUTORIAL - 5	1	18/03/2026		TLM3	CO1	T1,T2	
32.	Revision	1	20/03/2026					
No. of classes required to complete UNIT-II		16			No. of classes taken:			

I MID EXAMINATIONS (23-03-2026 TO 28-03-2026)

UNIT-III: Partial Differential Equations

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
33.	Introduction to Unit III	1	30/03/2026		TLM1	CO2	T1,T2	
34.	Formation of PDE by elimination of arbitrary constants	1	01/04/2026		TLM1	CO2	T1,T2	
35.	Formation of PDE by elimination of arbitrary functions	1	02/04/2026		TLM1	CO2	T1,T2	
36.	Formation of PDE by elimination of arbitrary functions	1	04/04/2026		TLM1	CO2	T1,T2	
37.	Solving of PDE	1	06/04/2026		TLM1	CO2	T1,T2	
38.	TUTORIAL - 6	1	08/04/2026		TLM3	CO2	T1,T2	
39.	Lagrange's Method	1	09/04/2026		TLM1	CO2	T1,T2	
40.	Homogeneous Linear PDE with constant coefficients	1	10/04/2026		TLM1	CO2	T1,T2	
41.	Homogeneous Linear PDE with constant coefficients	1	13/04/2026		TLM1	CO2	T1,T2	
42.	TUTORIAL - 7	1	15/04/2026		TLM3	CO2	T1,T2	
43.	Homogeneous Linear PDE with constant coefficients	1	16/04/2026		TLM1	CO2	T1,T2	
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV: Vector Differentiation

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
44.	Introduction to UNIT IV	1	17/04/2026		TLM1	CO3	T1,T2	
45.	Vector Differentiation	1	18/04/2026		TLM1	CO3	T1,T2	

46.	Gradient	1	20/04/2026		TLM1	CO3	T1,T2	
47.	TUTORIAL - 8	1	22/04/2026		TLM3	CO3	T1,T2	
48.	Directional Derivative	1	23/04/2026		TLM1	CO3	T1,T2	
49.	Divergence	1	24/04/2026		TLM1	CO3	T1,T2	
50.	Curl	1	25/04/2026		TLM1	CO3	T1,T2	
51.	Solenoidal fields, Irrotational fields, potential surfaces	1	27/04/2026		TLM1	CO3	T1,T2	
52.	TUTORIAL - 9	1	29/04/2026		TLM3	CO3	T1,T2	
53.	Solenoidal fields, Irrotational fields, potential surfaces	1	30/04/2026		TLM1	CO3	T1,T2	
54.	Laplacian, second order operators	1	01/05/2026		TLM1	CO3	T1,T2	
55.	Vector Identities	1	02/05/2026		TLM1	CO3	T1,T2	
56.	Vector Identities	1	04/05/2026		TLM1	CO3	T1,T2	
57.	TUTORIAL - 10	1	06/05/2026		TLM3	CO3	T1,T2	
No. of classes required to complete UNIT-IV		14			No. of classes taken:			

UNIT-V: Vector Integration

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
58.	Introduction to Unit-V	1	07/05/2026		TLM1	CO4	T1,T2	
59.	Line Integral	1	08/05/2026		TLM1	CO4	T1,T2	
60.	Circulation	1	11/05/2026		TLM1	CO4	T1,T2	
61.	TUTORIAL - 11	1	13/05/2026		TLM3	CO4	T1,T2	
62.	Work done	1	14/05/2026		TLM1	CO4	T1,T2	
63.	Surface Integral, Flux	1	15/05/2026		TLM1	CO4	T1,T2	
64.	Volume Integral	1	16/05/2026		TLM1	CO4	T1,T2	
65.	Green's Theorem	1	01/06/2026		TLM1	CO4	T1,T2	
66.	TUTORIAL - 12	1	03/06/2026		TLM3	CO4	T1,T2	
67.	Green's Theorem	1	04/06/2026		TLM1	CO4	T1,T2	
68.	Stoke's Theorem	1	05/06/2026		TLM1	CO4	T1,T2	
69.	Divergence Theorem	1	06/06/2026		TLM1	CO4	T1,T2	
70.	Divergence Theorem	1	08/06/2026		TLM1	CO4	T1,T2	
71.	Revision	1	10/06/2026					
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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
72.	Non-homogeneous Linear PDE with constant coefficients	2	11/06/2026 & 12/06/2026		TLM2	CO2	T1,T2	
No. of classes		2			No. of classes taken:			

II MID EXAMINATIONS (15-06-2026 TO 20-06-2026)

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

PART-CEVALUATION 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):	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.

Dr. K.R. Kavitha	Dr. K. JHANSI RANI	Dr. A. RAMI REDDY	Dr. A. RAMI REDDY
Course Instructor	Course Coordinator	Module Coordinator	HoD



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DIVISION OF CHEMISTRY
FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs.K. Sri Lakshmi

Course Name & Code : Engg Chemistry & 23FE06

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

Program/Sem/Sec : B.Tech./Sem-II/MECH

Credits:03

A.Y. :2025-26

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To enable the students to understand the fundamental concepts of chemistry and to provide them with the knowledge of industrial problems and finding the solutions.
- To strengthen the basic concepts of bonding models, advanced engineering materials, electrochemistry, batteries and polymers.
- To introduce instrumental methods and their applications.

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

CO1: Identify the troubles due to hardness of water and its maintenance in industrial applications. **(Understand)**

CO2: Apply Nernst equation in calculating cell potentials, compare batteries for different applications and outline the principles of corrosion for design and effective maintenance of various devices. **(Understand)**

CO3: Outline the importance of polymers and alternate fuels. **(Understand)**

CO4: Summarize the suitability of engineering materials like composites, refractories, lubricants, and building materials. **(Understand)**

CO5: Understand the concepts of collides, micelles and nanomaterials. **(Understand)**

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

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	1
CO2	3	2	2	2	-	2	2	-	-	-	-	2
CO3	3	3	2	2	-	2	2	-	-	-	-	2
CO4	3	2	2	2	-	2	2	-	-	-	-	2
CO5	3	2	1	1	-	-	-	-	-	-	-	1
1 = Slight (Low)			2 = Moderate (Medium)					3 = Substantial (High)				

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference: Books:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Textbook of Polymer Science, Fred W. Billmeyer Jr, 3rd Edition

PART-B**Course handout (Lesson plan): ASE****UNIT-I: Water Technology**

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 CO's, PO's of EC	1	03-02-2026		TLM1	
2.	Soft and hardwater, Estimation of hardness of water by EDTA Method	2	04-02-2026 & 06-02-2026		TLM1	
3.	Estimation of dissolved Oxygen	1	07-02-2026		TLM1	
4.	Boiler troubles – Priming, foaming	2	10-02-2026 & 11-02-2026		TLM1	
5.	Scale and sludge, Caustic embrittlement	1	13-02-2026		TLM1	
6.	Industrial water treatment	1	14-02-2026		TLM1	
7.	Specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards	2	17-02-2026 & 18-02-2026		TLM1	
8.	Ion-exchange processes - desalination of brackish water	1	20-02-2026		TLM1	
9.	reverse osmosis (RO) and electrodialysis	1	21-02-2026		TLM1	
10.	Revision and assignment	1	24-02-2026		TLM1	
No. of classes required to complete UNIT-I: 13				No. of classes taken:		

UNIT-II: ELECTROCHEMISTRY AND APPLICATIONS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
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1.	Electrochemical cell, Nernst equation	1	25-02-2026		TLM1
2.	Cell potential calculations and numerical problems	1	27-02-2026		TLM1
3.	Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad)	1	28-02-2026		TLM1
4.	Lithium ion batteries- principle and cell reactions	1	04-03-2026		TLM1
5.	Fuel cells-Basic Concepts, principle and working of hydrogen-oxygen Fuel cell.	1	06-03-2026		TLM1
6.	Corrosion-Introduction, Classification, corrosion, electrochemical theory of corrosion	1	07-03-2026		TLM1
7.	Metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses	2	10-03-2026 & 11-03-2026		TLM2
8.	Differential aeration cell corrosion, galvanic corrosion	1	13-03-2026		TLM2
9.	Factors affecting the corrosion, cathodic and anodic protection	2	14-03-2026 & 17-03-2026		TLM2
10.	electroplating and electroless plating (Nickel and Copper)	1	18-03-2026		TLM2
11.	Revision and assignment	1	20-03-2026		TLM1
No. of classes required to complete UNIT-II: 13				No. of classes taken:	

UNIT-III: POLYMERS AND FUEL CHEMISTRY

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 polymers, functionality of monomers	1	31-03-2026		TLM1	
2.	Mechanism of chain growth and step growth polymerization	1	01-04-2026		TLM1	
3.	Plastics -Thermo and Thermosetting plastics-	1	04-04-2026		TLM1	

	Preparation, properties and applications of – Polystyrene, PVC, Teflon					
4.	Preparation, properties and applications of – Bakelite, Nylon-6,6,	1	07-04-2026		TLM1	
5.	Elastomers–Buna-S, Buna-N, Thiokol rubbers–preparation, properties and applications	1	08-04-2026		TLM1	
6.	Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value;	1	10-04-2026		TLM1	
7.	Analysis of coal (Proximate and Ultimate analysis)	2	11-04-2026 & 15-04-2026		TLM1	
8.	Liquid Fuels, refining of petroleum, Octane and Cetane number	2	17-04-2026 & 18-04-2026		TLM1	
9.	Alternative fuels- propane, methanol, ethanol and bio fuel- bio diesel.	1	21-04-2026			
10.	Revision and assignment	1	22-04-2026		TLM1	
No. of classes required to complete UNIT-IV: 12				No. of classes taken:		

UNIT-IV: Modern Engineering Materials

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.	Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites	2	24-04-2026 & 25-04-2026		TLM1	
2.	Properties and Engineering applications of composites	1	28-04-2026		TLM1	
3.	Refractories- Classification, Properties, Factors affecting the refractory materials and Applications	2	29-04-2026 & 01-05-2026		TLM1	

4.	Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index	2	02-05-2026 & 05-05-2026		TLM1
5.	Flash point, Fire point, Cloud point, saponification and Applications	1	06-05-2026		TLM1
6.	Building materials- Portland Cement, constituents.	1	08-05-2026		TLM1
7.	Setting and Hardening of cement.	1	09-05-2026		TLM1
8.	Revision and assignment	1	12-05-2026		TLM1
No. of classes required to complete UNIT-IV: 11				No. of classes taken:	

UNIT-V: Surface Chemistry and Nanomaterial

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 surface chemistry, colloids.	1	13-05-2026		TLM1	
2.	Nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method)	2	15-05-2026 & 16-05-2026		TLM1	
3.	Chemical and biological methods of preparation of nanometals and metal oxides	2	02-06-2026 & 03-06-2026		TLM1	

4.	Stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir)	2	05-06-2026 & 09-06-2026		TLM1	
5.	BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors,	1	10-06-2025		TLM1	
9.	Revision and assignment	1	12-06-2025		TLM1	
No. of classes required to complete UNIT-V: 09				No. of classes taken:		

TOPICS 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.	Applications of semiconductors, superconductors and nanomaterials in advanced technologies.	1	13-06-2026		TLM1	

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

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mrs. K. Sri Lakshmi	Dr.V.Parvathi	Dr.V.Parvathi	Dr.T.Satyanarayana
Signature				



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 Permanently Affiliated to JNTUK, Kakinada

L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.

Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr P.Rakesh Kumar **Date:** 02-02-2026
Course Name & Code : Basic Electrical & Electronics Engineering – 23EE01
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem./Sec. : B.Tech/II/ME **A.Y.:** 2025-26
Regulations: R23

PREREQUISITE: Physics

Course Objectives (COs)

Basic Electrical Engineering:

To expose to the field of electrical & electronics engineering, laws and principles of electrical/electronic engineering and to acquire fundamental knowledge in the relevant field.

Basic Electronics Engineering

To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

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

PART-A: BASIC ELECTRICAL ENGINEERING	
C01	Extract electrical variables of AC & DC circuits using fundamental laws. (Understand)
C02	Understand the operation of electrical machines and measuring instruments. (Understand)
C03	Classify various energy resources, safety measures and interpret electricity bill generation in electrical systems. (Understand)
PART-B: BASIC ELECTRONICS ENGINEERING	
C04	Interpret the characteristics of various semiconductor devices (Knowledge)
C05	Infer the operation of rectifiers, amplifiers. (Understand)
C06	Contrast various logic gates, sequential and combinational logic circuits. (Understand)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
C01	3	2	3									1	3	2		2
C02	2	2												2		3
C03	2	2				3					2	2	2			
C04	3	2										1	2		3	2
C05	3	2										1	2		3	2
C06	2	2	2										2		2	1
	1 - Low			2 -Medium				3 - High								

TEXTBOOKS:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013

3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition
4. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
5. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

REFERENCE BOOKS:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhattacharya, Person Publications, 2018, Second Edition.
5. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
6. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
7. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

PART B: BASIC ELECTRONICS ENGINEERING

UNIT-I: Semiconductor Devices

Sl.	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 Course Outcomes	1	02-02-2026		TLM1	
2.	Evolution of electronics, Vacuum tubes to nano electronics	1	04-02-2026		TLM1	
3.	Characteristics of PN Junction Diode, Role-Play Pedagogy: "Inside the PN Junction"-ITM	1	05-02-2026		TLM1	
4.	Zener Effect — Zener Diode and its Characteristics	1	07-02-2026		TLM1	
5.	Bipolar Junction Transistor	1	09-02-2026		TLM1	
6.	Bipolar Junction Transistor	1	11-02-2026		TLM1	
7.	CB Configurations and Characteristics	1	12-02-2026		TLM2	
8.	CE Configurations and Characteristics. CC Configurations and Characteristics.	1	14-02-2026		TLM2	
9.	Elementary Treatment of Small Signal CE Amplifier.	1	16-02-2026		TLM2	
No. of classes required to complete UNIT-I: 09				No. of classes taken:		

UNIT-II: Basic Electronic Circuits and Instrumentation

Sl.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Rectifiers and power supplies: Block diagram description of a DC power supply	1	18-02-2026		TLM1	
11.	Working of full wave bridge rectifier, capacitor filter (no analysis)	1	19-02-2026		TLM1	
12.	Working of full wave bridge rectifier, capacitor filter (no analysis)	1	21-02-2026		TLM1	
13.	Amplifiers: Block diagram of Public Address system	1	23-02-2026		TLM1	
14.	Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency	1	25-02-2026		TLM2	

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	response.					
15.	Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. QUIZ -ITM	1	26-02-2026		TLM1	
16.	Electronic Instrumentation: Block diagram of an electronic instrumentation system.	1	28-02-2026		TLM2	
17.	Electronic Instrumentation: Block diagram of an electronic instrumentation system.	1	02-03-2026		TLM1	
No. of classes required to complete UNIT-II: 08				No. of classes taken:		

UNIT-III: Digital Electronics

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18.	Overview of Number Systems	1	04-03-2026		TLM1	
19.	Logic gates including Universal Gates -NOT, OR, AND, NOR, NAND, XOR and XNOR	1	05-03-2026		TLM2	
20.	BCD codes, Excess-3 code, gray code, Logic Gates as Decision Machines-ITM	1	07-03-2026		TLM1	
21.	Hamming code,	1	09-03-2026		TLM2	
22.	Basic Theorems and properties of Boolean Algebra, Boolean Algebra	1	11-03-2026		TLM1	
23.	Half and Full Adders,	1	12-03-2026		TLM1	
24.	Simple combinational circuits	1	16-03-2026		TLM1	
25.	Introduction to sequential circuits, Flip flops, Registers , Counters	1	18-03-2026		TLM1	
No. of classes required to complete UNIT-III: 08				No. of classes taken:		

I Mid Examinations: 23-03-2026 to 28-03-2026

PART A: BASIC ELECTRICAL ENGINEERING

UNIT-I: DC & AC Circuits

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Introduction to Course and Course Outcomes	1	30-03-2026		TLM1	
27.	DC Circuits: Electrical circuit elements (R, L and C)	1	01-04-2026		TLM1	
28.	Ohm's Law and its limitations, KCL & KVL, HUMAN KCL & KVL ROLE-PLAY-ITM	1	02-04-2026		TLM1	
29.	Series, Parallel, series-parallel circuits	1	04-04-2026		TLM1	
30.	Problems on series-parallel circuits		06-04-2026			
31.	Superposition theorem	1	08-04-2026		TLM1	
32.	AC Circuits: A.C. Fundamentals:	1	09-04-2026		TLM1	
33.	Equation of AC Voltage and current, waveform	1	13-04-2026		TLM1	
34.	Time period, frequency, amplitude, phase,	1	15-04-2026		TLM1	

Sl.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
35.	Phase difference, average value, RMS value		16-04-2026			
36.	Form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits	1	18-04-2026		TLM1	
37.	Concept of Impedance, Active power, reactive power and apparent power	1	20-04-2026		TLM2	
38.	Concept of power factor (Simple Numerical problems).	1	22-04-2026		TLM1	
No. of classes required to complete UNIT-I: 13				No. of classes taken:		

UNIT-II: Machines and Measuring Instruments

Sl.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
39.	Machines: Construction, principle and operation of DC Motor	2	23-04-2026 25-04-2026		TLM1	
40.	Construction, principle and operation of DC Generator	2	27-04-2026 29-04-2026		TLM2	
41.	Construction, principle and operation of Single-Phase Transformer	1	30-04-2026		TLM2	
42.	Construction, principle and operation of Three Phase Induction Motor	1	02-05-2026		TLM2	
43.	Construction, principle and operation of Alternator, Applications of electrical machines	1	04-05-2026 06-05-2026		TLM1	
44.	Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC)	1	07-05-2026		TLM2	
45.	Moving Iron (MI) Instruments, Wheatstone Bridge	1	09-05-2026		TLM2	
No. of classes required to complete UNIT-II: 09				No. of classes taken:		

UNIT-III: Energy Resources, Electricity Bill & Safety Measures

Sl.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
46.	Energy Resources: Conventional and non-conventional energy resources	1	11-05-2026		TLM1	
47.	Layout and operation of various Power Generation systems: Hydel power generation	2	13-05-2026 14-05-2026		TLM1	
48.	Layout and operation of nuclear power generation	1	16-05-2026		TLM1	
49.	Layout and operation of Solar power generation	1	01-06-2026 03-06-2026		TLM1	
50.	Electricity bill: Power rating of household appliances including air conditioners PCs, Laptops, Printers, etc. Electricity Bill as a Story Problem-ITM	1	04-06-2026 06-06-2026		TLM1	

Sl.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
51.	Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, Calculation of electricity bill for domestic consumers	2	01-06-2026 08-06-2026		TLM1	
52.	Equipment Safety Measures: Working principle of Fuse and Miniature Circuit Breaker (MCB), merits and demerits.	2	10-06-2026 11-06-2026		TLM1	
53.	Personal Safety Measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.	1	13-06-2026		TLM1	
No. of classes required to complete UNIT-III: 11				No. of classes taken:		

II Mid Examinations: 15-06-2026 to 20-06-2026

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions	02-02-2026	21-03-2026	8W
I Mid Examinations	23-03-2026	28-03-2026	1W
II Phase of Instructions	30-03-2026	16-05-2026	8W
Summer Vacation	18-05-2026	30-05-2026	2W
II Phase of Instructions	01-06-2026	13-06-2026	2W
II Mid Examinations	15-06-2026	20-06-2026	1W
Preparation and Practicals	22-06-2026	27-06-2026	1W
Semester End Examinations	29-06-2026	11-07-2026	2W

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering
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	fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to 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 a	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO b	Design and analyze electrical machines, modern drive and lighting systems
PSO c	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO d	Design controllers for electrical and electronic systems to improve their performance.

Date: 02-02-2026

Course Instructor

Dr. P. Rakesh Kumar

Course Coordinator

Dr. AVGA Marthanda

Module Coordinator

Dr. G. Nageswara Rao

Head of the Department

Dr. G.Srinivasulu



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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HAND OUT

PART-A

Name of Course Instructor : Mr. A. Koteswara Rao
Course Name & Code : Introduction to Programming(23CS01)
L-T-P Structure : 3-0-0 Credits:3
Program/Sem/Sec : B.Tech-ME/II/A A.Y.:2025-26

PRE-REQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVE(CEO):

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as datatypes, control structures, functions and arrays.
- To encourage collaborative learning and team work in coding projects

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

CO1:	Understand basics of computers, the concept of algorithm and algorithmic thinking.	Understand Level 2
CO2:	Analyze a problem and develop an algorithm to solve it.	Analyze Level4
CO3:	Implement various algorithms using the C programming language.	Apply Level3
CO4:	Understand more advanced features of C language.	Understand Level 2
CO5:	Develop problem-solving skills and the ability to debug and optimize the code.	Apply Level3

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

TEXTBOOKS:

- T1:** The C Programming Language", Brian W.Kernighan and Dennis M.Ritchie, Prentice Hall,1988 edition, 2015
- T2:** Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-HillEducation, 1996

REFERENCEBOOKS:

- R1:** Computing fundamentals and C Programming, Balagurusamy, E., McGraw-HillEducation, 2008.
- R2:** Programming in C,Reema Thareja, Oxford,2016, 2nd edition
- R3:** C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Programming and Problem Solving

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	H O D Sign Weekly
1.	Discussion of CEO's and CO's	1	02-02-2026		TLM2	
2.	History of Computers	1	02-02-2026		TLM2	
3.	Basic organization of a computer: ALU, input-output units.	2	05-02-2026		TLM2	
			07-02-2026			
4.	Memory, program counter	1	09-02-2026		TLM1, TLM2	
5.	Introduction to Programming Languages,	1	09-02-2026		TLM1, TLM2	
6.	Basics of a Computer Program- Algorithms	1	12-02-2026		TLM1	
7.	Flowcharts (Using Dia Tool), pseudo code.	1	14-02-2026		TLM1	
8.	Introduction to Compilation and Execution	1	16-02-2026		TLM1	
9.	Primitive Data Types	2	16-02-2026		TLM1	
			19-02-2026			
10.	Variables, and Constants, Basic Input and Output operations	1	21-02-2026		TLM1	
11.	Type Conversion, and Casting	1	23-02-2026		TLM1	
12.	Problem solving techniques: Algorithmic approach, characteristics of algorithm	1	23-02-2026		TLM1	
13.	Problem solving strategies: Top-down approach, Bottom-up approach	1	26-02-2026		TLM1	
14.	Time and space complexities of algorithms.	1	28-02-2026		TLM1	
No.of classes required to complete UNIT-I:15				No. of classes taken:		

UNIT-II: Control Structures

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	H O D Sign Weekly
15.	Simple sequential programs Conditional Statements	1	02-03-2026		TLM1	
16.	if, if-else	1	02-03-2026		TLM1, TLM2	
17.	Else-if ladder, nested if	1	05-03-2026		TLM1, TLM2	
18.	Switch, sample programs	1	07-03-2026		TLM1, TLM2	
			09-03-2026			
19.	Example programs on Decision Making and Branching	2	09-03-2026		TLM1, TLM2	
			09-03-2026			
20.	Loops: while , Example programs	1	12-03-2026		TLM1, TLM2	
21.	Loops: do-while, Example programs	1	14-03-2026		TLM1	
22.	Loops: for, Example programs	1	16-03-2026		TLM1	
23.	Nested Loops with examples	1	16-03-2026		TLM1	
24.	Break , continue ,Example programs	1	21-03-2026		TLM1	

No.of classes required to complete UNIT-II:11	No. of classes taken:
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UNIT-III: Arrays and Strings

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	H O D Sign Weekly
25.	Arrays Introduction, Declaration	1	30-03-2026		TLM1, TLM2	
26.	Array indexing, Accessing elements	1	30-03-2026		TLM1, TLM2	
27.	memory model	1	02-04-2026		TLM1, TLM2	
28.	programs with array of integers	1	04-04-2026		TLM1, TLM2	
29.	Introduction to two dimensional arrays	1	06-04-2026		TLM1, TLM2	
30.	2D Array indexing, Accessing elements	1	06-04-2026		TLM1, TLM2	
31.	programs with 2D arrays	1	09-04-2026		TLM1, TLM2	
32.	Introduction to Strings	1	11-04-2026		TLM1, TLM2	
33.	Reading and Writing Operations on Strings	1	13-04-2026		TLM1, TLM2	
34.	String Handling Functions	1	13-04-2026		TLM1, TLM2	
No. of classes required to complete UNIT-III:10				No. of classes taken:		

UNIT-IV: Pointers & User Defined Datatypes

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	H O D Sign Weekly
35	Introduction to Pointers	1	16-04-2026		TLM1, TLM2	
36.	dereferencing and address operators	1	18-04-2026		TLM1, TLM2	
37.	pointer and address arithmetic	1	20-04-2026		TLM1, TLM2	
38.	array manipulation using pointers	1	20-04-2026		TLM1, TLM2	
39	Introduction to User-defined data types	1	23-04-2026		TLM1, TLM2	
40.	Structures, Definition and Initialization	1	25-04-2026		TLM1, TLM2	
41.	Example programs	1	27-04-2026		TLM1, TLM2	
42.	Unions, examples	1	27-04-2026		TLM1, TLM2	
43.	Difference between structures & unions, Structures and pointers	1	30-04-2026		TLM1, TLM2	
No. of classes required to complete UNIT-IV:09				No. of classes taken:		

UNIT-V: Functions and File Handling

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	H O D Sign Weekly
44.	Introduction to Functions	1	30-04-2026		TLM1	
45.	Function Declaration and Definition	1	02-05-2026		TLM1, TLM2	
46.	Function call Return Types	1	04-05-2026		TLM1, TLM2	
47.	Function Arguments, types	1	04-05-2026		TLM1, TLM2	

48.	modifying parameters inside functions using pointers	1	07-05-2026		TLM1, TLM2	
49.	Examples on function with pointers	1	09-05-2026		TLM1, TLM2	
50.	arrays as parameters, Scope and Lifetime of Variables	1	11-05-2026		TLM1, TLM2	
51.	Introduction to Files, Basics of File Handling, Operations on Files	1	11-05-2026		TLM1, TLM2	
No.of classes required to complete UNIT-V:08					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
61.	Application Development using C	1	14-05-2026			
62.	Introduction to Data Structures	1	16-05-2026			

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

PART-C

EVALUATION PROCESS (R23 Regulation):

EvaluationTask	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
MidMarks =80%ofMax $((M1+Q1+A1),(M2+Q2+A2))$ +20%ofMin $((M1+Q1+A1),(M2+Q2+A2))$	M=30
Cumulative Internal Examination(CIE):M	30
Semester End Examination(SEE)	70
TotalMarks =CIE +SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	A. Koteswara Rao	Dr. B. Srinivasa Rao	Dr. Y. Vijay Bhaskar Reddy	Dr. S. Nagarjuna Reddy
Signature				



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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. M. B. S. Sreekara Reddy

Course Name & Code : Engineering Mechanics & 23ME02

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

Credits: 3

Program/Sem/Sec : B.Tech/II/ME

A.Y.: 2025-26

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The main objective of this course is

- To get familiarized with different types of force systems.
- To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.
- To teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies.
- To apply the Work-Energy method to particle motion.
- To understand the kinematics and kinetics of translational and rotational motion of rigid bodies

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

CO1	Determine the resultant of coplanar concurrent and non-concurrent force systems. (Apply-L3)
CO2	Apply static equilibrium conditions to determine unknown planar force systems and determine the frictional forces for bodies in contact. (Apply-L3)
CO3	Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes (Apply-L3).
CO4	Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle. (Apply-L3).
CO5	Solve the problems involving the translational and rotational motion of rigid bodies. (Apply-L3)

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

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

TEXTBOOKS:

1. Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., McGraw Hill Education 2017. 5th Edition.
2. Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli , University press. 2020. First Edition.
3. A Textbook of Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.

REFERENCE BOOKS:

1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill Education. 2017. First Edition.
2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI, 2002. 4th Edition.
3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L.G. Kraige., John Wiley, 2008. 6th Edition.
4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press, 2014. Second Edition
5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc., New Delhi, 2022, 14th Edition

PART-B**COURSE DELIVERY PLAN (LESSON PLAN): ENGINEERING MECHANICS (23ME02)****UNIT-I: Introduction to Engineering Mechanics and System of Forces**

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 Engineering Mechanics, CEOs, Course Outcomes, POs and PSOs	1	02-02-2026		TLM1	
2.	Introduction, Basic Terminology in Mechanics	1	03-02-2026		TLM1	
3.	Laws of mechanics	1	06-02-2026		TLM1/ TLM4	
4.	Force, Characteristics of forces	1	07-02-2026		TLM1	
5.	Resolution & Composition of Forces	1	09-02-2026		TLM1	
6.	Systems of Forces: Introduction, Classification	1	10-02-2026		TLM1	
7.	Coplanar Concurrent Forces, Numericals	1	13-02-2026		TLM1/ TLM3	
8.	Coplanar Non-Concurrent Forces, Numericals	1	16-02-2026		TLM1	
9.	Moment of force, applications, Numericals	1	17-02-2026		TLM1/ TLM4	
10.	Couples, Numericals	1	20-02-2026		TLM1	
11.	Resultant of Force Systems, Numericals	1	21-02-2026		TLM1/ TLM3	
12.	Numericals, Class Test	1	23-02-2026		TLM3	
No. of classes required to complete UNIT-I: 12				No. of classes taken:		

UNIT-II: Equilibrium of Systems of Forces and Friction

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction to Equilibrium of System of Forces, Free Body Diagrams, Numericals	1	24-02-2026		TLM1	
14.	Lami's Theorem, Numericals	1	27-02-2026		TLM1/ TLM4	
15.	Equations of Equilibrium of Force Systems	1	28-02-2026		TLM1	
16.	Triangle Law of Forces Numericals	1	02-03-2026		TLM1/ TLM4	
17.	Polygon Law of Forces, Numericals	1	06-03-2026		TLM1/ TLM4	

18.	Condition of Equilibrium, Numericals	1	07-03-2026		TLM1	
19.	Analysis of plane trusses, Numericals	1	09-03-2026		TLM1	
20.	Principle of Virtual Work with simple examples	1	10-03-2026		TLM1	
21.	Friction: Introduction, Terminology	1	13-03-2026		TLM1/ TLM4	
22.	Coulomb's Laws of dry friction, Coefficient of Friction, Cone of Static friction, Numericals	1	16-03-2026		TLM1	
23.	Limiting friction and impending motion of blocks resting on horizontal planes, Numericals	1	17-03-2026		TLM1	
24.	Numericals, Class Test	1	21-03-2026		TLM3	
No. of classes required to complete UNIT-II: 12				No. of classes taken:		

UNIT-III: Centroid, Centre of Gravity, Area Moments of Inertia, Mass Moment of Inertia

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.	Introduction to Centroid: Centroids of simple figures (from basic principles)	1	30-03-2026		TLM1/ TLM4	
26.	I, T, C, L Sections, Centre of Gravity: Centre of gravity of simple bodies (from basic principles)	1	31-03-2026		TLM1	
27.	Numericals on Centroid & Centre of Gravity	1	04-04-2026		TLM1	
28.	Area Moments of Inertia: Definition, Moment of inertia of I, T, C, L Sections	1	06-04-2026		TLM1	
29.	Polar Moment of Inertia, Transfer Theorem, Numericals	1	07-04-2026		TLM1	
30.	Mass Moment of Inertia: Moment of Inertia of Masses, Numericals	1	10-04-2026		TLM1	
31.	Transfer Formula for Mass Moments of Inertia for simple objects, Numericals	1	13-04-2026		TLM1	
32.	Numericals, Class Test	1	17-04-2026		TLM3	
No. of classes required to complete UNIT-III: 08				No. of classes taken:		

UNIT-IV: Rectilinear and Curvilinear motion of a particle

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.	Introduction to Kinematics and Kinetics	1	18-04-2026		TLM1	
34.	General Principles in Dynamics, Numericals	1	20-04-2026		TLM1	
35.	Rectilinear Motion - Motion with Uniform Velocity, Uniform Acceleration and Non-Uniform Acceleration	1	21-04-2026		TLM1	
36.	Curvilinear Motion - Motion with Uniform Velocity, Uniform Acceleration and Non-Uniform Acceleration	1	24-04-2026		TLM1	

37.	D'Alembert's Principle, Numericals	1	25-04-2026		TLM1	
38.	Work Energy method and applications to particle motion, Numericals	1	27-04-2026		TLM1	
39.	Impulse Momentum method (theory only)	1	28-04-2026		TLM1	
40.	Numericals, Class Test	1	01-05-2026		TLM3	
No. of classes required to complete UNIT-III: 08				No. of classes taken:		

UNIT-V: Rigid body Motion

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Introduction to Kinematics and Kinetics of rigid bodies in translation	1	02-05-2026		TLM1	
42.	Rotation about fixed axis, Numericals	1	04-05-2026		TLM1	
43.	Plane Motion - Numericals	1	05-05-2026		TLM1	
44.	Work Energy method and simple applications, Numericals	1	08-05-2026		TLM1	
45.	Impulse Momentum method and simple applications, Numericals	1	11-05-2026		TLM1	
46.	Numericals, Class Test	1	12-05-2026		TLM3	
47.	Revision of I Unit and II Unit	1	15-05-2026		TLM3	
48.	Revision of III Unit, IV Unit & V Unit	1	16-05-2026		TLM3	
No. of classes required to complete UNIT-III: 08				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 (Complete Mechanical Part)	A1=5
I-Descriptive Examination (Complete Mechanical Part)	M1=15
I-Quiz Examination (Complete Mechanical Part)	Q1=10
Assignment-II (Complete Civil Part)	A2=5
II- Descriptive Examination (Complete Civil Part)	M2=15
II-Quiz Examination (Complete Civil Part)	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 knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO 2	Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO 3	Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO 4	Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO 5	Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO 6	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).
PO 7	Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO 8	Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO 9	Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO 10	Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO 11	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)

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the principles of thermal sciences to design and develop various thermal systems.
PSO 2	To apply the principles of manufacturing technology, scientific management towards improvement of quality and optimization of engineering systems in the design, analysis and manufacturability of products.
PSO 3	To apply the basic principles of mechanical engineering design or evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr.M.B.S.S REDDY	Dr.M.B.S.S REDDY	Dr.B.SUDHEER KUMAR	Dr.M.B.S.S REDDY
Signature				



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)
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L.B. Reddy Nagar, Mylavaram, NTR Dist., Andhra Pradesh-521 230.
Phone: 08659-222933, Fax: 08659-222931

DIVISION OF CHEMISTRY
FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs.K.Sri Lakshmi & Dr.S.L.V.Rajesh Babu
Course Name & Code : Engineering Chemistry Lab & 23FE54
L-T-P Structure : **0-0-3** **Credits:1.5**
Program/Sem/Sec : B.Tech./Sem-II/MECH **A.Y. :2025-26**

Pre requisites: Nil

Course Educational Objective:

- To enable the students to perform different types of volumetric titrations.
- It provides an overview of preparation of polymers, nanomaterials and analytical techniques.

Course Outcomes: After completion of the course, the students will be able to,

- CO1:** Analyze important parameters of water to check its suitability for drinking purpose and industrial applications. (**Analyze**)
- CO2:** Acquire practical knowledge related to preparation of Bakelite and nanomaterials. (**Apply**)
- CO3:** Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus. (**Understand**)
- CO4:** To estimate the amount of calcium in cement and the strength of acid present in Pb-Acid battery. (**Apply**)
- CO5:** Improve individual / teamwork skills, communication and report writing skills with ethical values. (**Apply**)

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	1	2	-	-	-	-	-
CO2	3	-	1	-	-	2	1	-	-	-	-	-
CO3	3	2	1	-	-	-	2	-	-	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-
1 = Slight (Low)			2 = Moderate (Medium)				3 = Substantial (High)					

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

Bos Approved Lab Manual

Part-B**COURSE DELIVERY PLAN (LESSON PLAN):****MECH:**

S.No.	Experiment	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome Cos	HOD Sign Weekly
1.	Introduction to Engineeringchemistry lab	3	05-02-2026		TLM1		
2.	Preparation of a Bakelite	3	12-02-2026		TLM4	CO1	
3.	Measuring pH of given sample solution using pH meter.	3	19-02-2026		TLM4	CO1	
4.	Determination of amount of HCl using standard Na ₂ CO ₃ solution	3	26-02-2026		TLM4	CO1	
5.	Determination of Strength of an acid in Pb-Acid battery	3	05-03-2026		TLM4	CO1	
6.	Determination of hardness of a groundwater sample.	3	12-03-2026		TLM4	CO1	
7.	Determination of the Alkalinity of a given water sample.	3	02-04-2026		TLM4	CO1	
8.	Estimation of Ferrous Iron by Permanganometry.	3	09-04-2026		TLM4	CO1	
9.	Estimation of Ferrous Iron by Dichrometry.	3	16-04-2026		TLM4	CO2	
10.	Determination of viscosity of lubricating oil by Redwood Viscometer-1 .	3	23-04-2026		TLM4	CO5	
11.	Determination of viscosity of lubricating oil by Redwood Viscometer-2.	3	30-04-2026		TLM4	CO1	
12.	Additional experiment/repeat	3	07-05-2026		TLM4	CO1	
13.	Additional experiment/repeat	3	14-05-2026		TLM4	CO1	
14.	Additional experiment/repeat	3	04-06-2026		TLM4	CO1	
15.	Internal Exam	3	11-06-2026		TLM4	CO1	
	Total						

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

Part - C

EVALUATION PROCESS:

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 for laboratory course is based on the following parameters:

Evaluation Task	Marks
Day-to-Day Work	A1 = 10
Record & Observation	B1 = 5
Internal Exam	C1 = 15
Cumulative Internal Examination (CIE): (A1+B1+C1)	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	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.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mrs. K.Sri Lakshmi	Dr.V.Parvathi	Dr.V.Parvathi	Dr.T.Satyanarayana
Signature				



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ECE

LAB HANDOUT

PART-A

Date: 02-02-2026

Name of Course Instructor : Dr. P. Rakesh Kumar, Mrs.B.Rajewari,
Mr.T.Anil Raju, Dr.B.Y.V.N.R Swamy

Course Name & Code : Electrical & Electronics Engineering Workshop (23EE51)

L-T-P Structure : 0-0-3 **Credits** : 1.5

Program/Sem : B.Tech., MECH., II Sem **A.Y.** : 2025-26

PREREQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

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

CO1	Compute voltage, current and power in an electrical circuit. (Apply)
CO2	Compute medium resistance using Wheat stone bridge. (Apply)
CO3	Discover critical field resistance and critical speed of DC shunt generators. (Apply)
CO4	Estimate reactive power and power factor in electrical loads. (Understand)
CO5	Plot the characteristics of semiconductor devices. (Apply)
CO6	Demonstrate the working of various logic gates using ICs. (Understand)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
C01	3	2						2	3	2		1				
C02	2	2		2				2	2	2						
C03	2	2	2	2				2	2	2				2		
C04	2	2		3				2	3	2		1	2			
C05	3	2			2			2	2	2	1	1	2	2	3	2
C06	3	3		2	2			2	3	3		1			3	
	1 - Low			2 -Medium				3 - High								

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to BEEE Lab (Function Generators, CRO, RPS, Breadboard etc), Course Objectives and Outcomes.	3	03-02-2026		TLM4	
2.	Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.	3	10-02-2026		TLM4	
3.	Plot V – I characteristics of Zener Diode and its application as voltage Regulator.	3	17-02-2026		TLM4	
4.	Implementation of half wave and full wave rectifiers	3	24-02-2026		TLM4	
5.	Plot Input & Output characteristics of BJT in CB configuration-04	3	03-03-2026		TLM4	
6.	Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs	3	10-03-2026		TLM4	
7.	Verification of truth Tables of SR and JK Flip flop	3	17-03-2026		TLM4	
8.	Internal Lab Examination (Electronics)	3	31-03-2026		TLM4	
9.	Verification of KCL and KVL	3	07-04-2026		TLM4	
10.	Verification of Superposition Theorem	3	21-04-2026		TLM4	
11.	Measurement of Resistance using Wheat stone bridge	3	28-04-2026		TLM4	
12.	Magnetization Characteristics of DC Shunt Generator	3	05-05-2026		TLM4	
13.	Measurement of Power and Power factor using Single-phase wattmeter	3	12-05-2026		TLM4	
14.	Calculation of Electrical Energy for Domestic Premises	3	02-06-2026		TLM4	
15.	Internal Lab Examination (Electricals)	3	09-06-2026		TLM4	
No. of classes required: 45				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 (R20 Regulation):

Evaluation Task	Expt. no's	Marks
Day to Day work	1,2,3,4,5,6,7,8...	A1 =10

Record and observation	1,2,3,4,5,6,7,8...	B1 = 5
Internal Exam	1,2,3,4,5,6,7,8...	C1=15
Cumulative Internal Examination (CIE):(A1+B1+C1)	1,2,3,4,5,6,7,8...	30
Semester End Examination (SEE)	1,2,3,4,5,6,7,8...	70
Total Marks=CIE+SEE		100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to 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 a	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO b	Design and analyze electrical machines, modern drive and lighting systems
PSO c	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO d	Design controllers for electrical and electronic systems to improve their performance.

Date: 02-02-2026

Course Instructors

Dr. P. Rakesh Kumar
Mrs.B.Rajewari
Mr.T.Anil Raju
Dr.B.Y.V.N.R Swamy

Course Coordinator

Dr. AVGA Marthanda

Module Coordinator

Dr. G.Nageswara Rao

Head of the Department

Dr. G.Srinivasulu

PART-B

COURSE DELIVERY PLAN -LESSONPLAN:

S. No.	Programs to be covered	No. of Classes		Actual Date of Completion	Delivery Method	HOD SIGN WEEKLY
		Required as per the schedule	Tentative Date of Completion			
1.	Week1: Familiarization with programming environment	03	04-02-2026		DM5	
2.	Week2: Problem-solving using Algorithms and Flow charts.	03	11-02-2026		DM5	
3.	Week3: Exercise Programs on Variable types and type conversions	03	18-02-2026		DM5	
4.	Week4: Exercise Programs on Operators and the precedence and as associativity.	03	25-02-2026		DM5	
5.	Week5: Exercise Programs on Branching and logical expressions	03	04-03-2026		DM5	
6.	Week6: Exercise Programs on Loops, while and for loops	03	11-03-2026		DM5	
7.	Week7: Exercise Programs on 1 D Arrays & searching.	03	18-03-2026		DM5	
8.	Week8: Exercise Programs on 2 D arrays, sorting and Strings.	03	01-04-2026		DM5	
9.	Week9: Exercise Programs on Pointers, structures and dynamic memory allocation	03	08-04-2026		DM5	
10.	Week10: Exercise Programs on Bit fields, Self-Referential Structures, Linked lists	03	15-04-2026		DM5	
11.	Week 11: Exercise Programs on Functions, call by value, scope and extent.	03	22-04-2026		DM5	
12.	Week 12: Exercise Programs on Recursion, the structure of recursive calls	03	29-04-2026		DM5	
13.	Week 13: Exercise Programs on Call by reference, dangling pointers Week 14: Exercise Programs on File handling.	03	06-05-2026		DM5	
15.	Lab Internal	03	13-05-2026		DM5	

Delivery Methods			
DM1	Chalk and Talk	DM4	Assignment/Test/Quiz
DM2	ICT Tools	DM5	Laboratory/Field Visit
DM3	Tutorial	DM6	Web-based Learning

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.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	A. Koteswara Rao	Dr. B. Srinivasa Rao	Dr. Y. Vijay Bhaskar Reddy	Dr. S. Nagarjuna Reddy
Signature				

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): (B. Tech – II Semester - Section – A) (R23)

Schedule of the lab: Every Friday (From 01.00 PM – 04.00 PM)

Batch size:

S.No	Batches	Regd. Nos	Total No. of Students
01	Section A	25761A0301 –362	62

Division of Batches:

Batch No	Regd. No of students	Batch size	Batch No	Regd. No of students	Batch size
A1	24761A0301 – 307	07	B1	24761A0332 – 338	07
A2	24761A0308 – 313	06	B2	24761A0339 – 344	06
A3	24761A0314 – 319	06	B3	24761A0345 – 350	06
A4	24761A0320 – 325	06	B4	24761A0351 – 356	06
A5	24761A0326 – 331	06	B5	24761A0357 – 362	06

List of Experiments:

1. Verification of Law of moments (Ex 1)
2. Verification of Law of Parallelogram of Forces and Lamis Theorem. (Ex 2)
3. Verification of the Law of polygon for coplanar-concurrent forces acting on a particle in equilibrium and to find the value of unknown forces considering particle to be in equilibrium using universal force table. (Ex 3)
4. Verification of the conditions of equilibrium of a rigid body under the action of coplanar non- concurrent, parallel force system with the help of a simply supported beam. (Ex 4)
5. Determination of coefficient of Static and Rolling Frictions (Ex 5)
6. Verification of Law of Triangle of Forces. (Ex 6)
7. Determination of Centre of Gravity of different shaped Plane Lamina. (Ex 7)
8. Determine the Moment of Inertia of the compound pendulum about an axis perpendicular to the plane of oscillation and passing through its centre of mass. (Ex 8)
9. Determine the Moment of Inertia of a Flywheel. (Ex 9)
10. Verification of Newton’s Second Law of motion. (Ex 10)

Division of Cycles:

S. No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
01	Introduction to Engineering Mechanics Lab, Demonstration of all experiments, CEOs, and COs of the Laboratory	3	06-02-2026		TLM4	
Cycle-I (Each batch will perform the experiments according to the academic calendar and the schedule) The batch A1 schedule is shown as an example here						
02	Verification of Law of moments	3	13-02-2026		TLM4	
03	Verification of Law of Parallelogram of Forces and Lamis Theorem.	3	20-02-2026		TLM4	
04	Verification of the Law of polygon for coplanar-concurrent forces acting on a particle in equilibrium and to find the value of unknown forces considering particle to be in equilibrium using universal force table	3	27-02-2026		TLM4	
05	Verification of the conditions of equilibrium of a rigid body under the action of coplanar non-concurrent, parallel force system with the help of a simply supported beam.	3	06-03-2026		TLM4	
06	Determination of coefficient of Static and Rolling Frictions.	3	13-03-2026		TLM4	
07	Repetition of experiments of cycle-I	3	20-03-2026		TLM4	
I Mid Exams: 23-03-2026 to 28-03-2026						

Cycle II						
(Each batch will perform the experiments according to the academic calendar and the schedule)						
The batch A1 schedule is shown as an example here						
08	Verification of Law of Triangle of Forces.	3	10-04-2026		TLM4	
09	Determination of Centre of Gravity of different shaped Plane Lamina.	3	17-04-2026		TLM4	
10	Determine the Moment of Inertia of the compound pendulum about an axis perpendicular to the plane of oscillation and passing through its centre of mass.	3	24-04-2026		TLM4	
11	Determine the Moment of Inertia of a Flywheel.	3	01-05-2026		TLM4	
12	Verification of Newton's Second Law of motion.	3	08-05-2026		TLM4	
13	Repetition of experiments of cycle-II	3	15-05-2026		TLM4	
14	Beyond Syllabus	3	05-06-2026		TLM4	
15	Lab Internal Examination	3	12-06-2026		TLM4	
Summer Vacation: 18-05-2026 to 30-05-2026						
II Mid Exams: 15-06-2026 to 20-06-2026						

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

ACADEMIC CALENDAR

Commencement of II Semester Classwork	02-02-2026		
Description	From	To	Weeks
I Phase of Instructions	02-02-2026	21-03-2026	7 Weeks
I Mid Examinations	23-03-2026	28-03-2026	1 Week
II Phase of Instructions	30-03-2026	16-05-2026	7 Weeks
Summer Vacation	18-05-2026	30-05-2026	2 Weeks
II Phase of Instructions	01-06-2026	13-06-2026	2 Weeks
II Mid Examinations	15-06-2026	20-06-2026	1 Week
Preparation and Practical Examinations	22-06-2026	27-06-2026	1 Week
Semester End Examinations	29-06-2026	11-07-2026	2 Weeks
Commencement of III Semester Class work	13 - 07 - 2026		

Schedule of Experiments:

Date	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5
06-02-2026	Introduction to Engineering Mechanics Lab, Demonstration of all experiments, CEOs, and COs of the Laboratory									
13-02-2026	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5
20-02-2026	Ex 2	Ex 3	Ex 4	Ex 5	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 1
27-02-2026	Ex 3	Ex 4	Ex 5	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 1	Ex 2
06-03-2026	Ex 4	Ex 5	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 1	Ex 2	Ex 3
13-03-2026	Ex 5	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 1	Ex 2	Ex 3	Ex 4
20-03-2026	Repetition of experiments of cycle-I									
10-04-2026	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10
17-04-2026	Ex 7	Ex 8	Ex 9	Ex 10	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 6
24-04-2026	Ex 8	Ex 9	Ex 10	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 6	Ex 7
01-05-2026	Ex 9	Ex 10	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 6	Ex 7	Ex 8
08-05-2026	Ex 10	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 6	Ex 7	Ex 8	Ex 9
15-05-2026	Repetition of experiments of cycle-II									

Lab Occupancy Time Table (B.Tech II Sem: Section - A/ S)

↓Day/Date→	9.00 - 10.00	10.00 - 11.00	11.00 - 12.00	12.00 - 1.00	1.00 - 2.00	2.00 - 3.00	3.00 - 14.00
Monday				LUNCH BREAK			
Tuesday							
Wednesday							
Thursday							
Friday						EM Lab	
Saturday							

Faculty - In Charges:

S.No	Class	Section	Lab Assistant	Faculty - In Charge
1	B.Tech - II Semester	A	Mr. A.D. Mallikarjuna Rao (NT 237)	Dr. B. Sudheer Kumar Mr. K. Venkateswara Reddy Dr.M.B.S.Sreekara Reddy

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Expt. no's	Marks
Day to Day work = A	1,2,3,4,5,6,7,8,9 &10	A = 10
Record = B	1,2,3,4,5,6,7,8,9 &10	B = 05
Internal Test / Viva = C	1,2,3,4,5,6,7,8,9 &10	C = 15
Cumulative Internal Examination: A + B + C = 30	1,2,3,4,5,6,7,8,9 &10	30
Semester End Examinations = D Procedure: 20 M; Experimental Work & Results: 30 M; Viva - Voce: 20 M	1,2,3,4,5,6,7,8,9 &10	D = 70
Total Marks: A + B + C + D = 100	1,2,3,4,5,6,7,8,9 &10	100

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To build a professional career and pursue higher studies with sound knowledge in Mathematics, Science and Mechanical Engineering.
PEO 2	To inculcate strong ethical values and leadership qualities for graduates to become successful in multidisciplinary activities.
PEO 3	To develop inquisitiveness towards good communication and lifelong learning.

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
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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 principles of thermal sciences to design and develop various thermal systems.
PSO 2	To apply the principles of manufacturing technology, scientific management towards improvement of quality and optimization of engineering systems in the design, analysis and manufacturability of products.
PSO 3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Signature				
Name of the Faculty	Dr. B. Sudheer Kumar Mr. K. Venkateswara Reddy Dr.M.B.S.Sreekara Reddy	Dr. B.Sudheer Kumar	Dr. B.Sudheer Kumar	Dr.M.B.S.Sreekara Reddy
Designation	Course Instructor	Course Coordinator	Module Coordinator	HOD