



FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM	: I B. Tech., II-Sem., Mech.
ACADEMIC YEAR	: 2024-25
COURSE NAME & CODE	: Differential Equations & Vector Calculus
L-T-P STRUCTURE	: 3-0-0
COURSE CREDITS	: 3
COURSE INSTRUCTOR	: Mrs. K. N. V. Lakshmi
COURSE COORDINATOR	: Dr. K.R. Kavitha
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	21-01-2025		TLM2			
2.	Course Outcomes, Program Outcomes	1	23-01-2025		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	23-01-2025		TLM1	CO1	T1,T2	
4.	Linear Differential equation	1	24-01-2025		TLM1	CO1	T1,T2	
5.	Bernoulli's DE	1	25-01-2025		TLM1	CO1	T1,T2	
6.	Exact DE	1	28-01-2025		TLM1	CO1	T1,T2	
7.	Exact DE	1	30-01-2025		TLM1	CO1	T1,T2	
8.	Non-exact DE Type I	1	30-01-2025		TLM1	CO1	T1,T2	
9.	TUTORIAL - 1	1	31-01-2025		TLM3	CO1	T1,T2	
10.	Non-exact DE Type II	1	01-02-2025		TLM1	CO1	T1,T2	
11.	Non-exact DE Type III	1	04-02-2025		TLM1	CO1	T1,T2	
12.	Non-exact DE Type IV	1	06-02-2025		TLM1	CO1	T1,T2	
13.	Newton's Law of cooling	1	06-02-2025		TLM1	CO1	T1,T2	
14.	TUTORIAL - 2	1	07-02-2025		TLM3	CO1	T1,T2	
15.	Law of natural growth and decay	1	11-02-2025		TLM1	CO1	T1,T2	
16.	Electrical circuits	1	13-02-2025		TLM1	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	13-02-2025		TLM1	CO1	T1,T2	
18.	Solving a homogeneous DE	1	14-02-2025		TLM1	CO1	T1,T2	
19.	Finding Particular Integral, P.I for e^{ax+b}	1	15-02-2025		TLM1	CO1	T1,T2	
20.	P.I for Cos bx, or sin bx	1	18-02-2025		TLM1	CO1	T1,T2	
21.	P.I for polynomial function	1	20-02-2025		TLM1	CO1	T1,T2	
22.	P.I for $e^{ax+b}v(x)$	1	20-02-2025		TLM1	CO1	T1,T2	
23.	TUTORIAL - 3	1	21-02-2025		TLM3	CO1	T1,T2	
24.	P.I for $x^k v(x)$	1	22-02-2025		TLM1	CO1	T1,T2	
25.	Method of Variation of parameters	1	25-02-2025		TLM1	CO1	T1,T2	

26.	Method of Variation of parameters	1	27-02-2025		TLM1	CO1	T1,T2	
27.	TUTORIAL - 4	1	27-02-2025		TLM3	CO1	T1,T2	
28.	Simultaneous linear equations	1	28-02-2025		TLM1	CO1	T1,T2	
29.	L-C-R circuits	1	01-03-2025		TLM1	CO1	T1,T2	
30.	Simple Harmonic motion	1	04-03-2025		TLM1	CO1	T1,T2	
31.	TUTORIAL - 5	1	06-03-2025		TLM3	CO1	T1,T2	
32.	TUTORIAL - 5	1	06-03-2025		TLM3	CO1	T1,T2	
33.	Revision	1	07-03-2025					
No. of classes required to complete UNIT-II		17			No. of classes taken:			

I MID EXAMINATIONS (10-03-2025 TO 15-03-2025)

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
34.	Introduction to Unit III	1	18-03-2025		TLM1	CO2	T1,T2	
35.	Formation of PDE by elimination of arbitrary constants	1	20-03-2025		TLM1	CO2	T1,T2	
36.	Formation of PDE by elimination of arbitrary functions	1	20-03-2025		TLM1	CO2	T1,T2	
37.	Formation of PDE by elimination of arbitrary functions	1	21-03-2025		TLM1	CO2	T1,T2	
38.	Solving of PDE	1	22-03-2025		TLM1	CO2	T1,T2	
39.	Lagrange's Method	1	25-03-2025		TLM1	CO2	T1,T2	
40.	Lagrange's Method	1	27-03-2025		TLM1	CO2	T1,T2	
41.	Homogeneous Linear PDE with constant coefficients	1	27-03-2025		TLM1	CO2	T1,T2	
42.	TUTORIAL - 6	1	28-03-2025		TLM3	CO2	T1,T2	
43.	Homogeneous Linear PDE with constant coefficients	1	29-03-2025		TLM1	CO2	T1,T2	
44.	Homogeneous Linear PDE with constant coefficients	1	01-04-2025		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
45.	Introduction to UNIT IV	1	03-04-2025		TLM1	CO3	T1,T2	
46.	Vector Differentiation	1	03-04-2025		TLM1	CO3	T1,T2	
47.	TUTORIAL - 7	1	04-04-2025		TLM3	CO3	T1,T2	
48.	Gradient	1	08-04-2025		TLM1	CO3	T1,T2	

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

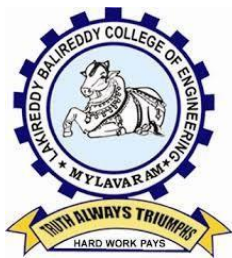
PART-CEVALUATION PROCESS (R23 Regulation):

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.

Mrs. K. N. V. Lakshmi	Dr. K.R. Kavitha	Dr. A. RAMI REDDY	Dr. A. RAMI REDDY
Course Instructor	Course Coordinator	Module Coordinator	HOD



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF FRESHMANENGINEERING

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/ASE

Credits:03

A.Y. :2023-24

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, DhanpatRai, 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	21-01-2025		TLM1	
2.	Soft and hardwater, Estimation of hardness of water by EDTA Method	1	22-01-2025		TLM1	
3.	Estimation of dissolved Oxygen	1	24-01-2025		TLM1	
4.	Boiler troubles – Priming, foaming	2	25-01-2025 & 28-01-2025		TLM1	
5.	Scale and sludge, Caustic embrittlement	2	29-01-2025 & 31-01-2025		TLM1	
6.	Industrial water treatment	1	01-02-2025		TLM1	
7.	Specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards	2	04-02-2025 & 05-02-2025		TLM1	
8.	Ion-exchange processes - desalination of brackish water	1	07-02-2025		TLM1	
9.	reverse osmosis (RO) and electrodialysis	1	08-02-2025		TLM1	
10.	Revision and assignment	2	11-02-2025 & 12-02-2025		TLM1	
No. of classes required to complete UNIT-I: 14				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
1.	Electrochemical cell, Nernst equation	1	14-02-2025		TLM1	
2.	Cell potential calculations and numerical problems	1	15-02-2025		TLM1	

3.	Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad)	1	18-02-2025		TLM1	
4.	Lithium ion batteries-principle and cell reactions	1	19-02-2025		TLM1	
5.	Fuel cells-Basic Concepts, principle and working of hydrogen-oxygen Fuel cell.	1	21-02-2025		TLM1	
6.	Corrosion-Introduction, Classification, corrosion, electrochemical theory of corrosion	1	22-02-2025		TLM1	
7.	Metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses	1	25-02-2025		TLM2	
8.	differential aeration cell corrosion, galvanic corrosion	2	28-02-2025 & 01-03-2025		TLM2	
9.	Factors affecting the corrosion, cathodic and anodic protection	1	04-03-2025		TLM2	
10.	electroplating and electroless plating (Nickel and Copper)	1	05-03-2025		TLM2	
11.	Revision and assignment	2	07-03-2025 & 08-03-2025		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	18-03-2025		TLM1	
2.	Mechanism of chain growth and step growth polymerization	1	19-03-2025		TLM1	
3.	Plastics –Thermo and Thermosetting plastics-Preparation, properties and applications of – Polystyrene, PVC, Teflon	1	21-03-2025		TLM1	
4.	Preparation, properties and applications of – Bakelite, Nylon-6,6,	1	22-03-2025		TLM1	

5.	Elastomers–Buna-S, Buna-N, Thiokol rubbers–preparation, properties and applications	1	25-03-2025		TLM1	
6.	Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value;	1	26-03-2025		TLM1	
7.	Analysis of coal (Proximate and Ultimate analysis)	2	28-03-2025 & 29-03-2025		TLM1	
8.	Liquid Fuels, refining of petroleum, Octane and Cetane number	2	01-04-2025 & 02-04-2025		TLM1	
9.	Alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.	2	04-04-2025 & 08-04-2025			
10.	Revision and assignment	1	09-04-2025		TLM1	
No. of classes required to complete UNIT-IV: 13				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	11-04-2025 & 12-04-2025		TLM1	
2.	Properties and Engineering applications of composites	1	15-04-2025		TLM1	
3.	Refractories- Classification, Properties, Factors affecting the refractory materials and Applications	2	16-04-2025 & 19-04-2025		TLM1	
4.	Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index	2	22-04-2025 & 23-04-2025		TLM1	
5.	Flash point, Fire point, Cloud point, saponification and Applications	1	25-04-2025		TLM1	
6.	Building materials- Portland Cement, constituents.	1	26-04-2025		TLM1	

7.	Setting and Hardening of cement.	1	29-04-2025		TLM1	
8.	Revision and assignment	1	30-04-2025		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	02-05-2025		TLM1	
2.	Nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method)	2	03-05-2025 & 06-05-2025		TLM1	
3.	Chemical and biological methods of preparation of nanometals and metal oxides	2	07-05-2025 & 09-05-2025		TLM1	
4.	Stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir)	2	10-05-2025 & 13-05-2025		TLM1	
5.	BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors,	1	14-05-2025		TLM1	
9.	Revision and assignment	1	16-05-2025		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	17-05-2025		TLM1	

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

TLM2	PPT	TLM5	ICT (NPTEL/SwayamPra bha/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.A.Rami Reddy
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

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DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. P. James Vijay

Course Name & Code : Basic Electrical & Electronics Engineering – 23EE01

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

Credits : 3

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

A.Y. : 2024-25

Regulation : 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-B: BASIC ELECTRONICS ENGINEERING	
CO4	Interpret the characteristics of various semiconductor devices (Knowledge)
CO5	Infer the operation of rectifiers, amplifiers. (Understand)
CO6	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
CO4	3	2										1	2		3	2
CO5	3	2										1	2		3	2
CO6	2	2	2										2		2	1
1 - Low			2 -Medium			3 - High										

TEXTBOOKS:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

REFERENCE BOOKS:

1. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
2. Basic Electrical and Electronics Engineering, S. K. Bhattacharya, Person Publications, 2018, Second Edition.
3. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
4. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
5. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Mech

PART B: BASIC ELECTRONICS ENGINEERING

UNIT-I: Semiconductor Devices

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 – Course Outcomes	1	20-01-2025		TLM1	
2.	Evolution of electronics, Vacuum tubes to nano electronics	1	21-01-2025		TLM1	
3.	Characteristics of PN Junction Diode	1	22-01-2025		TLM1	
4.	Zener Effect — Zener Diode and its Characteristics	1	25-01-2025		TLM1	
5.	Zener Effect — Zener Diode and its Characteristics	1	27-01-2025		TLM1	
6.	Bipolar Junction Transistor	1	28-01-2025		TLM1	
7.	Bipolar Junction Transistor	1	29-01-2025		TLM1	
8.	CB Configurations and Characteristics	1	01-02-2025		TLM2	
9.	CE, CC Configurations and Characteristics.	1	03-02-2025		TLM2	
10.	Elementary Treatment of Small Signal CE Amplifier.	1	04-02-2025		TLM1	
No. of classes required to complete UNIT-I: 10				No. of classes taken:		

UNIT-II: Basic Electronic Circuits and Instrumentation

UNIT-I: In 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
11.	Rectifiers and power supplies: Block diagram description of a DC power supply	1	05-02-2025		TLM1	
12.	Working of full wave bridge rectifier, capacitor filter (no analysis)	1	08-02-2025		TLM1	
13.	Working of full wave bridge rectifier, capacitor filter (no analysis)	1	10-02-2025		TLM1	
14.	Working of simple Zener voltage regulator.	1	11-02-2025		TLM1	
15.	Amplifiers: Block diagram of Public Address system	1	12-02-2025		TLM2	
16.	Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response.	1	15-02-2025		TLM2	
17.	Electronic Instrumentation: Block diagram of an electronic instrumentation system.	1	17-02-2025		TLM2	
No. of classes required to complete UNIT-II: 07				No. of classes taken:		

UNIT-III: Digital Electronics

Sl.	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	18-02-2025		TLM1	
19.	Logic gates including Universal Gates,	1	19-02-2025		TLM2	
20.	BCD codes, Excess-3 code, gray code	1	22-02-2025		TLM1	
21.	Hamming code, Boolean	1	24-02-2025		TLM2	

	Algebra, Basic Theorems and properties of Boolean Algebra					
22.	Simple combinational circuits	1	25-02-2025		TLM1	
23.	Half and Full Adders, Introduction to sequential circuits, Flip flops,	2	03-03-2025		TLM1	
24.	Registers and counters	2	05-03-2025		TLM2	
25.	Revision	1	08-03-2025		TLM1	
No. of classes required to complete UNIT-III: 10				No. of classes taken:		

I Mid Examinations: 10-03-2025 to 15-03-2025

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-IV, V & UNIT-VI)	A1=5
I-Descriptive Examination (Units-IV, V & UNIT-VI)	M1=15
I-Quiz Examination (Units-IV, V & UNIT-VI)	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-I, II & III)	M2=15
II-Quiz Examination (UNIT-I, II & III)	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	13-01-2025	08-03-2025	8W
I Mid Examinations	10-03-2025	15-03-2024	1W
II Phase of Instructions	17-03-2025	17-05-2025	9W
II Mid Examinations	02-06-2025	07-06-2025	1W
Preparation and Practicals	09-06-2025	14-06-2025	1W
Semester End Examinations	16-06-2025	28-06-2025	2W

PART-D

PROGRAMME OUTCOMES (POs):

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

	engineering and IT tools including prediction and 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: 23-01-2025

Course Instructor

Mr. P. James Vijay

Course Coordinator

Dr. P. Rakesh Kumar

Module Coordinator

Dr. T. Satyanarayana

Head of the Department

Dr. G. Srinivasulu

COs	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
C01	3	-	-	-	-	-	-	-	-	-	-	-	1	-
C02	3	-	-	-	-	-	-	-	-	-	-	-	2	-
C03	3	2	-	-	-	-	-	-	-	-	-	-	2	-
C04	3	2	-	-	-	-	-	-	-	-	-	-	2	-
C05	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-Hill Education, 1996

REFERENCE BOOKS:

- R1:** Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 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	HOD Sign Weekly
1.	Discussion of CEO’s and CO’s	1	20-01-2025		TLM1/ TLM2	
2.	History of Computers	1	21-01-2025		TLM1/ TLM2	
3.	Basic organization of a computer: ALU, input-output units.	2	23-01-2025		TLM1/ TLM2	
			25-01-2025			
4.	Memory, program counter	1	27-01-2025		TLM1/ TLM2	
5.	Introduction to Programming Languages,	1	28-01-2025		TLM1/ TLM2	
6.	Basics of a Computer Program- Algorithms	1	30-01-2025		TLM1/ TLM2	
7.	Flowcharts (Using Dia Tool), pseudo code.	1	01-02-2025		TLM1/ TLM2	
8.	Introduction to Compilation and Execution	1	03-02-2025		TLM1/ TLM2	
9.	Primitive Data Types	2	04-02-2025		TLM1/ TLM2	
			06-02-2025			
10.	Variables, and Constants, Basic Input and Output operations	2	08-02-2025		TLM1/ TLM2	
			10-02-2025			
11.	Type Conversion, and Casting	1	11-02-2025		TLM1/ TLM2	
12.	Problem solving techniques: Algorithmic approach, characteristics of algorithm	1	13-02-2025		TLM1/ TLM2	
13.	Problem solving strategies: Top-down approach, Bottom-up approach	1	15-02-2025		TLM1/ TLM2	
14	Time and space complexities of algorithms.	1	17-02-2025		TLM1/ TLM2	
No. of classes required to complete UNIT – I: 17				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	HOD Sign Weekly
15.	Conditional Statements	1	18-02-2025		TLM1/ TLM2	
16.	if, if-else, nested if-else , else-if ladder	2	20-02-2025		TLM1/ TLM2	
			22-02-2025			
17.	switch	1	24-02-2025		TLM1/ TLM2	
18.	Example programs on Decision Making and Branching	1	25-02-2025		TLM1/ TLM2	
19.	Loops: while , Example programs	1	28-02-2025		TLM1/ TLM2	
20.	do-while, for	1	01-03-2025		TLM1/ TLM2	
21.	Example programs on Loops	1	03-03-2025		TLM1/ TLM2	
22.	Break and Continue	1	04-03-2025		TLM1/ TLM2	
23.	Example programs on Patterns	1	06-03-2025		TLM1/ TLM2	
24.	Revision	1	08-03-2025			
No. of classes required to complete UNIT – II: 11				No. of classes taken:		

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	HOD Sign Weekly
25.	Arrays Introduction, Declaration	1	17-03-2025		TLM1/ TLM2	
26.	Array indexing, Accessing elements	1	18-03-2025		TLM1/ TLM2	
27.	memory model	1	20-03-2025		TLM1/ TLM2	
28.	programs with array of integers	1	22-03-2025		TLM1/ TLM2	
29.	Introduction to two dimensional arrays	2	24-03-2025		TLM1/ TLM2	
			25-03-2025			
30.	2D Array indexing, Accessing elements	1	27-03-2025		TLM1/ TLM2	
31.	programs with 2D arrays	1	29-03-2025		TLM1/ TLM2	
32.	Introduction to Strings	1	01-04-2025		TLM1/ TLM2	
33.	Reading and Writing Operations on Strings	1	03-04-2025		TLM1/ TLM2	
34.	String Handling Functions	2	07-04-2025		TLM1/ TLM2	
			08-04-2025			
35.	Example Programs using Strings	1	10-04-2025		TLM1/ TLM2	
No. of classes required to complete UNIT – III: 13				No. of classes taken:		

UNIT – IV: Pointers & User Defined Data types

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Introduction to Pointers	1	12-04-2025		TLM1/ TLM2	
37.	dereferencing and address operators	1	15-04-2025		TLM1/ TLM2	
38.	pointer and address arithmetic	1	17-04-2025		TLM1/ TLM2	
39.	array manipulation using pointers	1	19-04-2025		TLM1/ TLM2	
40.	User-defined data types	1	21-04-2025		TLM1/ TLM2	
41.	Structures , Definition and Initialization	1	22-04-2025		TLM1/ TLM2	
42.	Example programs	1	24-04-2025		TLM1/ TLM2	
43.	Unions	1	26-04-2025		TLM1/ TLM2	
44.	Example programs	1	28-04-2025		TLM1/ TLM2	
45.	Revision	1	29-04-2025		TLM1/ TLM2	
No. of classes required to complete UNIT – IV: 10				No. of classes taken:		

UNIT – V: Functions & File Handling

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
46.	Introduction to Functions	1	01-05-2025		TLM1/ TLM2	
47.	Function Declaration and Definition	1	03-05-2025		TLM1/ TLM2	
48.	Function call Return Types	1	05-05-2025		TLM1/ TLM2	
49.	Arguments	1	06-05-2025		TLM1/ TLM2	
50.	modifying parameters inside functions using pointers	1	08-05-2025		TLM1/ TLM2	
51.	arrays as parameters	1	10-05-2025		TLM1/ TLM2	

52.	Scope and Lifetime of Variables	1	12-05-2025		TLM1/ TLM2	
53.	Introduction to Files, Basics of File Handling	1	13-05-2025		TLM1/ TLM2	
54.	Operations on Files	1	15-05-2025		TLM1/ TLM2	
No. of classes required to complete UNIT – V: 09					No. of classes taken:	

Content beyond the Syllabus:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
55.	Application Development using C	1	17-05-2025		TLM1/ TLM2	

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

PART-C

EVALUATION PROCESS (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):

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an 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 the 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	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
PO6	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
PO7	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.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1	Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques.
PSO2	Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr.Y.Kranthi Kumar	Dr.K.Venkat Rao	Dr.Y.Vijaya Bhaskar Reddy	Dr.S.Jayaprada
Signature				



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 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 MECHANICAL ENGINEERING

COURSE HANDOUT (PART-A)

Name of Course Instructor	: Dr.M.B.S.Sreekara Reddy, Professor	
Course Name & Code	: Engineering Mechanics & 23ME02	
L-T-P Structure	: 3 (L) – 0 (T) – 0 (P)	Credits : 03
Program/Sem/Sec	: B. Tech / II-Sem / A Section	A.Y. : 2024-25
PREREQUISITE	: Engineering Physics, Mathematics	

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, students 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	PO12	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	Learning Outcome COs	Textbook followed	HOD Sign Weekly
01	Introduction to Engineering Mechanics, CEOs, Course Outcomes, POs and PSOs	1	20-01-2025		TLM1	CO1	T1, T2, R1 to R5	
02	Introduction, Basic Terminology in Mechanics	1	21-01-2025		TLM1	CO1	T1, T2, R1 to R5	
03	Laws of mechanics	1	22-01-2025		TLM1	CO1	T1, T2, R1 to R5	
04	Force, Characteristics of forces	1	24-01-2025		TLM1	CO1	T1, T2, R1 to R5	
05	Resolution & Composition of Forces	1	27-01-2025		TLM1	CO1	T1, T2, R1 to R5	
06	Numericals	1	28-01-2025		TLM1	CO1	T1, T2, R1 to R5	
07	Numericals	1	29-01-2025		TLM1	CO1	T1, T2, R1 to R5	
08	Systems of Forces: Introduction, Classification	1	31-01-2025		TLM1	CO1	T1, T2, R1 to R5	
09	Coplanar Concurrent Forces, Numericals	1	03-02-2025		TLM1	CO1	T1, T2, R1 to R5	
10	Coplanar Non-Concurrent Forces, Numericals	1	04-02-2025		TLM1	CO1	T1, T2, R1 to R5	
11	Moment of force, applications, Numericals	1	05-02-2025		TLM1	CO1	T1, T2, R1 to R5	
12	Couples, Numericals	1	05-02-2025		TLM1	CO1	T1, T2, R1 to R5	
13	Resultant of Force Systems, Numericals	1	07-02-2025		TLM1	CO1	T1, T2, R1 to R5	
14	Numericals	1	10-02-2025		TLM1	CO1	T1, T2, R1 to R5	
15	Numericals, Class Test	1	11-02-2025		TLM3	CO1	T1, T2, R1 to R5	
No. of classes required to complete UNIT - I:		15			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	Learning Outcome COs	Textbook followed	HOD Sign Weekly
16	Introduction to Equilibrium of System of Forces	1	12-02-2025		TLM1	CO2	T1, T2, R1 to R5	
17	Free Body Diagrams, Numericals	1	14-02-2025		TLM1	CO2	T1, T2, R1 to R5	
18	Lami's Theorem, Numericals	1	17-02-2025		TLM1	CO2	T1, T2, R1 to R5	
19	Equations of Equilibrium of Force Systems	1	18-02-2025		TLM1	CO2	T1, T2, R1 to R5	
20	Triangle Law of Forces Numericals	1	19-02-2025		TLM1	CO2	T1, T2, R1 to R5	
21	Polygon Law of Forces, Numericals	1	19-02-2025		TLM1	CO2	T1, T2, R1 to R5	
22	Condition of Equilibrium, Numericals	1	21-02-2025		TLM1	CO2	T1, T2, R1 to R5	
23	Analysis of plane trusses, Numericals	1	24-02-2025		TLM1	CO2	T1, T2, R1 to R5	
24	Principle of Virtual Work with simple examples	1	25-02-2025		TLM1	CO2	T1, T2, R1 to R5	
25	Friction: Introduction, Terminology	1	28-02-2025		TLM1	CO2	T1, T2, R1 to R5	
26	Coulomb's Laws of dry friction, Coefficient of Friction, Cone of Static friction, Numericals	1	28-02-2025		TLM1	CO2	T1, T2, R1 to R5	
27	Limiting friction and impending motion of blocks resting on horizontal planes, Numericals	1	03-03-2025		TLM1	CO2	T1, T2, R1 to R5	
28	Limiting friction and impending motion of blocks resting on inclined planes, Numericals	1	04-03-2025		TLM1	CO2	T1, T2, R1 to R5	
29	Numericals	1	05-03-2025		TLM1	CO2	T1, T2, R1 to R5	
30	Numericals, Class Test	1	07-03-2025		TLM3	CO2	T1, T2, R1 to R5	
No. of classes required to complete UNIT - II:		15			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	Learning Outcome COs	Textbook followed	HOD Sign Weekly
31	Introduction to Centroid: Centroids of simple figures (from basic principles)	1	17-03-2025		TLM1	CO3	T1, T2, R1 to R5	
32	I, T, C, L Sections, Centre of Gravity: Centre of gravity of simple bodies (from basic principles)	1	18-03-2025		TLM1	CO3	T1, T2, R1 to R5	
33	Numericals on Centroid	1	19-03-2025		TLM1	CO3	T1, T2, R1 to R5	
34	Numericals on Centroid	1	21-03-2025		TLM1	CO3	T1, T2, R1 to R5	
35	Numericals on Centre of Gravity	1	24-03-2025		TLM1	CO3	T1, T2, R1 to R5	
36	Numericals on Centre of Gravity	1	25-03-2025		TLM1	CO3	T1, T2, R1 to R5	
37	Numericals	1	26-03-2025		TLM1	CO3	T1, T2, R1 to R5	
38	Area Moments of Inertia: Definition, Moment of inertia of I, T, C, L Sections	1	28-03-2025		TLM1	CO3	T1, T2, R1 to R5	
39	Polar Moment of Inertia, Transfer Theorem, Numericals	1	01-04-2025		TLM1	CO3	T1, T2, R1 to R5	
40	Numericals	1	02-04-2025		TLM1	CO3	T1, T2, R1 to R5	
41	Mass Moment of Inertia: Moment of Inertia of Masses, Numericals	1	04-04-2025		TLM1	CO3	T1, T2, R1 to R5	
42	Transfer Formula for Mass Moments of Inertia for simple objects, Numericals	1	07-04-2025		TLM1	CO3	T1, T2, R1 to R5	
43	Numericals	1	08-04-2025		TLM1	CO3	T1, T2, R1 to R5	
44	Numericals	1	09-04-2025		TLM1	CO3	T1, T2, R1 to R5	
45	Numericals, Class Test	1	11-04-2025		TLM3	CO3	T1, T2, R1 to R5	
No. of classes required to complete UNIT - III:		15			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	Learning Outcome COs	Textbook followed	HOD Sign Weekly
46	Introduction to Kinematics and Kinetics	1	15-04-2025		TLM1	CO4	T1, T2, R1 to R5	
47	General Principles in Dynamics, Numericals	1	16-04-2025		TLM1	CO4	T1, T2, R1 to R5	
48	Rectilinear Motion - Motion with Uniform Velocity, Uniform Acceleration and Non-Uniform Acceleration	1	16-04-2025		TLM1	CO4	T1, T2, R1 to R5	
49	Numericals	1	21-04-2025		TLM1	CO4	T1, T2, R1 to R5	
50	Curvilinear Motion - Motion with Uniform Velocity, Uniform Acceleration and Non-Uniform Acceleration	1	22-04-2025		TLM1	CO4	T1, T2, R1 to R5	
51	Numericals	1	22-04-2025		TLM1	CO4	T1, T2, R1 to R5	
52	D'Alembert's Principle, Numericals	1	23-04-2025		TLM1	CO4	T1, T2, R1 to R5	
53	Work Energy method and applications to particle motion, Numericals	1	25-04-2025		TLM1	CO4	T1, T2, R1 to R5	
54	Numericals	1	28-04-2025		TLM1	CO4	T1, T2, R1 to R5	
55	Impulse Momentum method (theory only)	1	28-04-2025		TLM1	CO4	T1, T2, R1 to R5	
56	Numericals	1	29-04-2025		TLM1	CO4	T1, T2, R1 to R5	
57	Numericals, Class Test	1	30-04-2025		TLM3	CO4	T1, T2, R1 to R5	
No. of classes required to complete UNIT - IV:		12			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	Learning Outcome COs	Textbook followed	HOD Sign Weekly
58	Introduction to Kinematics and Kinetics of rigid bodies in translation	1	02-05-2025		TLM1	CO5	T1, T2, R1 to R5	
59	Numericals	1	02-05-2025		TLM1	CO5	T1, T2, R1 to R5	
60	Rotation about fixed axis, Numericals	1	05-05-2025		TLM1	CO5	T1, T2, R1 to R5	
61	Numericals	1	06-05-2025		TLM1	CO5	T1, T2, R1 to R5	
62	Plane Motion - Numericals	1	06-05-2025		TLM1	CO5	T1, T2, R1 to R5	
63	Numericals	1	09-05-2025		TLM1	CO5	T1, T2, R1 to R5	
64	Work Energy method and simple applications, Numericals	1	09-05-2025		TLM1	CO5	T1, T2, R1 to R5	
65	Impulse Momentum method and simple applications, Numericals	1	12-05-2025		TLM1	CO5	T1, T2, R1 to R5	
66	Numericals, Class Test	1	13-05-2025		TLM3	CO5	T1, T2, R1 to R5	
67	Revision of I Unit and II Unit	1	14-05-2025		TLM 1 to 6	CO5	T1, T2, R1 to R5	
68	Revision of III Unit	1	16-05-2025		TLM 1 to 6	CO5	T1, T2, R1 to R5	
69	Revision of IV Unit	1	16-05-2025		TLM 1 to 6	CO5	T1, T2, R1 to R5	
70	Revision of V Unit	1	16-05-2025		TLM 1 to 6	CO5	T1, T2, R1 to R5	
-	II Mid Examinations	1 Week	03-06-2024 to 08-06-2024					
No. of classes required to complete UNIT - V:		13			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

ACADEMIC CALENDER - B.Tech - II Semester (R23):

Commencement of Class work		12-02-2024	
Description	From	To	Weeks
I Phase of Instructions	13-01-2025	08-03-2025	8 Weeks
I Mid Examinations	10-03-2025	15-03-2025	1 Week
II Phase of Instructions	17-03-2025	17-05-2025	9 Weeks
Summer Vacation	19-05-2025	31-05-2025	2 Weeks
II Mid Examinations	02-06-2025	07-06-2025	1 Week
Preparation and Practicals	09-06-2025	14-06-2025	1 Week
Semester End Examinations	16-06-2025	28-06-2025	2 Week
Commencement of Next (III) Semester Class Work		30-06-2025	

Class Time Table - B.Tech - II Sem: Section – A (R23)

↓Day/Date→	09.00 – 10.00	10.00 – 11.00	11.00 - 12.00	12.00 - 13.00	13.00 - 14.00	14.00 - 15.00	15.00 - 16.00
Monday		EM		LUNCH BREAK			
Tuesday		EM					
Wednesday		EM					
Thursday							
Friday		EM					
Saturday							

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 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.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr.M.B.S.Sreekara Reddy	Mr. J. Subba Reddy	Dr. B. Sudheer Kumar	Dr.M.B.S.Sreekara Reddy
Signature				



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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

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

Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF FRESHMANENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs.K.Sri Lakshmi

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. :2023-24

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	24-01-2025		TLM1		
2.	Preparation of a Bakelite	3	31-01-2025		TLM4	CO1	
3.	Determination of amount of HCl using standard Na ₂ CO ₃ solution	3	07-02-2025		TLM4	CO1	
4.	Determination of Strength of an acid in Pb-Acid battery	3	14-02-2025		TLM4	CO1	
5.	Estimation of Ferrous Iron by Dichrometry	3	21-02-2025		TLM4	CO1	
6.	Estimation of Ferrous Iron by Permanganometry	3	28-02-2025		TLM4	CO1	
7.	Determination of hardness of a groundwater sample.	3	07-03-2025		TLM4	CO1	
8.	Determination of calorific value of gases by Junker's gas calorimeter.	3	21-03-2025		TLM4	CO1	
9.	Determination of viscosity of lubricating oil by Redwood Viscometer-1 &2	3	28-03-2025		TLM4	CO2	
10.	Preparation of nanomaterials by precipitation method	3	04-04-2025		TLM4	CO5	
11.	Additional experiment/repeat	3	11-04-2025		TLM4	CO1	
12.	Additional experiment/repeat	3	25-04-2025		TLM4	CO1	
13.	Additional experiment/repeat	3	02-05-2025				
14.	Additional experiment/repeat	3	09-05-2025				
15.	Internal Exam	3	16-05-2025		TLM4		
	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	Dr. Lakshmi V R Babu Syamala	Dr.V.Parvathi	Dr.V.Parvathi	Dr.A.Rami Reddy
Signature				

[illegible]

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): B.Tech. Mech- II Sem

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	22-01-2025		TLM4	
2.	Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.	3	29-01-2025		TLM4	
3.	Plot V – I characteristics of Zener Diode and its application as voltage Regulator	3	29-01-2025		TLM4	
4.	Implementation of half wave and full wave rectifiers	3	05-02-2025		TLM4	
5.	Plot Input & Output characteristics of BJT in CB configuration	3	12-02-2025		TLM4	
6.	Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs / Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs	3	19-02-2025		TLM4	
7.	Internal Lab Examination (Electronics)	3	05-03-2025		TLM4	
No. of classes required: 21				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.
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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 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: 22-01-2025

Course Instructor

Mr. P. James Vijay

Course Coordinator

Mrs. B. Rajeswari

Module Coordinator

Dr. T. Satyanarayana

Head of the Department

Dr. G. Srinivasulu



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING(AI&ML)

PART-A

Name of Course Instructor : **Mr.Y.Kranthi Kumar**
Course Name & Code : **Computer Programming Lab (23CS51)**
L-T-P Structure : **0-0-3** Credits: **1.5**
Program/Sem/Sec : **B.Tech - ME /II Sem/A** A.Y. : **2024-25**

PRE-REQUISITE: Fundamentals of Mathematics.

COURSE EDUCATIONAL OBJECTIVE (CEO): The course aims to give students hands – on experience and train them on the concepts of the C- programming language.

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

CO1:	Read, understand, and trace the execution of programs written in C language. (Understand)	Apply–Level2
CO2:	Apply the right control structure for solving the problem. (Apply)	Apply–Level3
CO3:	Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, pointers and files in C. (Apply)	Apply–Level3
CO4:	Improve individual / teamwork skills, communication and report writing skills with ethical values.	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
CO1	3	2	-	-	3	-	-	-	-	-	-	-	2	-
CO2	3	2	2	-	3	-	-	-	-	-	-	-	3	-
CO3	3	2	2	-	3	-	-	-	-	-	-	-	3	-
CO4	-	-	-	-	-	-	-	2	2	2	2	2	-	-

TEXTBOOKS:

T1: Ajay Mittal, Programming in C: A practical approach, Pearson.

T2: Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education.

REFERENCE BOOKS:

R1: Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India

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):

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.	Week 1: Familiarization with programming environment	3	20-01-2025		DM5	
2.	Week 2: Problem-solving using Algorithms and Flow charts.	3	27-01-2025		DM5	
3.	Week 3: Exercise Programs on Variable types and type conversions	3	03-02-2025		DM5	
4.	Week 4: Exercise Programs on Operators and the precedence and as associativity.	3	10-02-2025		DM5	
5.	Week 5: Exercise Programs on Branching and logical expressions	3	17-02-2025		DM5	
6.	Week 6: Exercise Programs on Loops, while and for loops	3	24-02-2025		DM5	
7.	Week 7: Exercise Programs on 1 D Arrays & searching.	3	03-03-2025		DM5	
8.	Week 8: Exercise Programs on 2 D arrays, sorting and Strings.	3	10-03-2025		DM5	
9.	Week 9: Exercise Programs on Pointers, structures and dynamic memory allocation	3	17-03-2025		DM5	
10.	Week 10: Exercise Programs on Bit fields, Self-Referential Structures, Linked lists	3	24-03-2025		DM5	
11.	Week 11: Exercise Programs on Functions, call by value, scope and extent.	3	07-04-2025		DM5	
12.	Week 12: Exercise Programs on Recursion, the structure of recursive calls	3	21-04-2025		DM5	
13.	Week 13: Exercise Programs on Call by reference, dangling pointers	3	28-04-2025		DM5	
14.	Week 14: Exercise Programs on File handling.	3	05-05-2025		DM5	
15.	Lab Internal	3	12-05-2025			

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

EVALUATION PROCESS (R23 Regulations): **PART-C**

Evaluation Task	Marks
Day-to-day work	D1=10
Record	R1=05
Internal Test	IT1=15
Continuous Internal Evaluation(CIE)=D1+R1+IT1	30
Procedure/Algorithm	P1=20
Experimentation/Program execution	E1=10
Observations/Calculations/Validation	O1=10
Result/Inference	R1=10
Viva voce	V1=20
Semester End Examination (SEE)= P1+ E1+ O1+ V1	70
Total Marks = CIE+SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

P01	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
P02	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.
P03	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.
P04	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.
P05	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
P06	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

P07	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.
P08	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
P09	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
P010	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.
P011	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.
P012	Life-long learning: Recognize the need for and have the preparation and ability to engaging independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1	Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques.
PSO2	Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr.Y.Kranthi Kumar	Dr.K.Venkat Rao	Dr.Y.Vijaya Bhaskar Reddy	Dr.S.Jayaprada
Signature				



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution

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

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

Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor(s): Dr..B.S.Sreekara Reddy,
Mr. S.Srinivasa Reddy,
Mr. K. V. Viswanadh

Course Name & Code : Engineering Mechanics Lab & 23ME52 Regulation : R23
L-T-P Structure : 0-0-3 – 1 ½ Credits : 01 ½
Program/Sem/Sec : B.Tech – II Semester – A Section A.Y. : 2024-25
Continuous Internal Assessment : 30 Semester End Examination 70

PREREQUISITE: Engineering Mechanics, Engineering Physics

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The students completing the course are expected to:

- Verify the Law of Parallelogram and Triangle of Forces.
- Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
- Analyze the system of Pulleys and Moment of Inertia of Compound Pendulum and Flywheel.

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

CO1	Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller. (Applying - L3)
CO2	Verify the Law of Polygon of Forces and Law of Moment using force polygon and bell crank lever. (Applying - L3)
CO3	Determine the Centre of gravity and Moment of Inertia of different configurations. (Applying - L3)
CO4	Apply the equilibrium conditions of a rigid body under the action of different force systems. (Applying - L3)

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

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

REFERENCES

References:

1. S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., Engineering Mechanics, 5th Edition, McGraw Hill Education.
2. Hibbeler R.C., Engineering Mechanics: Statics and Dynamics, 14th Edition, Pearson Education, Inc., New Delhi, 2022
3. Engineering Mechanics Lab Manual

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): (B. Tech – II Semester - Section – A) (R 23)

Schedule of the lab: Every Thursday (from 09.00 AM – 12.00 PM)

Batch size:

S.No	Batches	Regd. Nos	Total No. of Students
01	Section A	24761A0301 – 365	65

Division of Batches:

Batch No	Regd. No of students	Batch size	Batch No	Regd. No of students	Batch size
A1	24761A0301 – 307	07	B1	24761A0334 – 340	07
A2	24761A0308 – 314	07	B2	24761A0341 – 347	07
A3	24761A0315 – 321	07	B3	24761A0348 – 353	06
A4	24761A0322 – 327	06	B4	24761A0354 – 359	06
A5	24761A0328 – 333	06	B5	24761A0360 – 365	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	23-01-2025		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	30-01-2025		TLM4	

03	Verification of Law of Parallelogram of Forces and Lamis Theorem.	3	06-02-2025		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	13-02-2025		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	20-02-2025		TLM4	
06	Determination of coefficient of Static and Rolling Frictions.	3	27-02-2025		TLM4	
07	Repetition of experiments of cycle-I	3	06-03-2025		TLM4	
I Mid Exams: 10-03-2025 to 15-03-2025						
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	Demonstration of Cycle-II Experiments	3	20-03-2025		TLM4	
09	Verification of Law of Triangle of Forces.	3	27-03-2025		TLM4	
10	Determination of Centre of Gravity of different shaped Plane Lamina.	3	03-04-2025		TLM4	
11	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	10-04-2025		TLM4	
12	Determine the Moment of Inertia of a Flywheel.	3	17-04-2025		TLM4	
13	Verification of Newton's Second Law of motion.	3	24-04-2025		TLM4	
14	Repetition of experiments of cycle-II	3	01-05-2025		TLM4	
	Lab Internal Examination	3	08-05-2025		TLM4	
	Beyond Syllabus	3	15-05-2025		TLM4	
Summer Vacation: 19-05-2025 to 31-05-2025						
II Mid Exams: 02-06-2025 to 07-06-2025						

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	20-01-2025		
Description	From	To	Weeks
I Phase of Instructions	21-01-2025	08-03-2025	8 Weeks
I Mid Examinations	10-03-2025	15-03-2025	1 Week
II Phase of Instructions	17-03-2025	17-05-2025	9 Weeks
Summer Vacation	19-05-2025	31-05-2025	2 Weeks
II Mid Examinations	02-06-2025	07-06-2025	1 Week
Preparation and Practical Examinations	09-06-2025	14-06-2025	1 Week
Semester End Examinations	16-06-2025	28-06-2025	2 Weeks
Commencement of III Semester Class work	30 - 06 - 2025		

Schedule of Experiments:

Date	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5
23-01-2025	Introduction to Engineering Mechanics Lab, Demonstration of all experiments, CEOs, and COs of the Laboratory									
30-01-2025	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5
06-02-2025	Ex 2	Ex 3	Ex 4	Ex 5	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 1
13-02-2025	Ex 3	Ex 4	Ex 5	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 1	Ex 2
20-02-2025	Ex 4	Ex 5	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 1	Ex 2	Ex 3
27-02-2025	Ex 5	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 1	Ex 2	Ex 3	Ex 4
06-03-2025	Repetition of experiments of cycle-I									
20-03-2025	Demonstration of Cycle-II Experiments									
27-03-2025	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10
03-04-2025	Ex 7	Ex 8	Ex 9	Ex 10	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 6
10-04-2025	Ex 8	Ex 9	Ex 10	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 6	Ex 7
17-04-2025	Ex 9	Ex 10	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 6	Ex 7	Ex 8
24-04-2025	Ex 10	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 6	Ex 7	Ex 8	Ex 9
01-05-2025	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	EM Lab						
Friday							
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.M.B.S.Sreevara Reddy Mr. S.Srinivasa Reddy Mr. K.V.Viswanadh

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.
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 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.M.B.S.Sreekara Reddy Mr. S.Srinivasa Reddy Mr. K.V.Viswanadh	Dr. B.Sudheer Kumar	Dr. B.Sudheer Kumar	Dr.M.B.S.Sreekara Reddy
Designation	Course Instructor	Course Coordinator	Module Coordinator	HOD