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.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF FRESHMAN ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. Lakshmi V R Babu Syamala
Course Name & Code : Engineering Chemistry & 23FE06
L-T-P Structure : **3-0-0** **Credits:03**
Program/Sem/Sec : B.Tech./Sem-II/ME **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. Billmayer Jr, 3rd Edition

PART-B

Course handout (Lesson plan): ME

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	13-02-2024		TLM1	
2.	Soft and hardwater, Estimation of hardness of water by EDTA Method	1	14-02-2024		TLM1	
3.	Estimation of dissolved Oxygen	1	15-02-2024		TLM1	
4.	Boiler troubles – Priming, foaming	2	17-02-2024 & 20-02-2024		TLM1	
5.	Scale and sludge, Caustic embrittlement	2	21-02-2024 & 22-02-2024		TLM1	
6.	Industrial water treatment	1	24-02-2024		TLM1	
7.	Specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards	1	27-02-2024		TLM1	
8.	Ion-exchange processes - desalination of brackish water	1	28-02-2024		TLM1	
9.	reverse osmosis (RO) and electrodialysis	1	29-02-2024		TLM1	
10.	Revision and assignment	1	02-03-2024		TLM1	
No. of classes required to complete UNIT-I: 12				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	05-03-2024		TLM1	
2.	Cell potential calculations and numerical problems	1	06-03-2024		TLM1	
3.	Primary cells – Zinc-air battery, Secondary cells –	1	07-03-2024		TLM1	

	Nickel-Cadmium (NiCad)					
4.	Lithium ion batteries-principle and cell reactions	1	09-03-2024		TLM1	
5.	Fuel cells-Basic Concepts, principle and working of hydrogen-oxygen Fuel cell.	1	12-03-2024		TLM1	
6.	Corrosion-Introduction, Classification, corrosion, electrochemical theory of corrosion	1	13-03-2024		TLM1	
7.	Metal oxide formation by dry electrochemical corrosion, Pilling Bed-worth ratios and uses	1	14-03-2024		TLM2	
8.	differential aeration cell corrosion, galvanic corrosion	1	16-03-2024		TLM2	
9.	Factors affecting the corrosion, cathodic and anodic protection	1	19-03-2024		TLM2	
10.	electroplating and electro less plating (Nickel and Copper)	2	20-03-2024 & 21-03-2024		TLM2	
11.	Revision and assignment	1	23-03-2024		TLM1	
No. of classes required to complete UNIT-II: 12				No. of classes taken:		

UNIT-III: 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.	Introduction to polymers, functionality of monomers	1	26-03-2024		TLM1	
2.	Mechanism of chain growth and step growth polymerization	1	27-03-2024		TLM1	
3.	Plastics –Thermo and Thermosetting plastics-Preparation, properties and applications of – Polystyrene, PVC, Teflon	1	28-03-2024		TLM1	
4.	Preparation, properties and applications of – Bakelite, Nylon-6,6,	1	30-03-2024		TLM1	
5.	Elastomers–Buna-S, Buna-N, Thiokol rubbers–preparation, properties and applications	2	10-04-2024 & 13-04-2024		TLM1	
6.	Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value;	1	16-04-2024		TLM1	

7.	Analysis of coal (Proximate and Ultimate analysis)	1	18-04-2024		TLM1	
8.	Liquid Fuels, refining of petroleum, Octane and Cetane number	1	20-04-2024		TLM1	
9.	Alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.	1	23-04-2024			
10.	Revision and assignment	1	24-04-2024		TLM1	
No. of classes required to complete UNIT-IV: 11				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	25-04-2024 & 27-04-2024		TLM1	
2.	Properties and Engineering applications of composites	1	30-04-2024		TLM1	
3.	Refractories- Classification, Properties, Factors affecting the refractory materials and Applications	2	01-05-2024 & 02-05-2024		TLM1	
4.	Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index	1	04-05-2024		TLM1	
5.	Flash point, Fire point, Cloud point, saponification and Applications	1	07-05-2024		TLM1	
6.	Building materials- Portland Cement, constituents.	1	08-05-2024		TLM1	
7.	Setting and Hardening of cement.	1	09-05-2024		TLM1	
8.	Revision and assignment	1	11-05-2024		TLM1	
No. of classes required to complete UNIT-IV: 10				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	14-05-2043		TLM1	
2.	Nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method)	2	15-05-2024 & 16-05-2024		TLM1	
3.	Chemical and biological methods of preparation of nanometals and metal oxides	2	18-05-2024 & 21-05-2024		TLM1	
4.	Stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir)	2	22-05-2024 & 23-05-2024		TLM1	
5.	BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors,	2	25-05-2024 & 28-05-2024		TLM1	
9.	Revision and assignment	1	29-05-2024		TLM1	
No. of classes required to complete UNIT-V: 08				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.	2	30-05-2024 & 01-06-2024		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 (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

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				

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FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM	**:** I B. Tech., II-Sem., ME
ACADEMIC YEAR	**:** 2023-24
COURSE NAME & CODE	**:** Differential Equations & Vector Calculus
L-T-P STRUCTURE	**:** 3-0-0
COURSE CREDITS	**:** 3
COURSE INSTRUCTOR	**:** Dr. M.Srinivasa Reddy
COURSE COORDINATOR	**:** Dr.
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	1
CO2	3	2	-	-	-	-	-	-	-	-	-	1
CO3	3	1	-	-	-	-	-	-	-	-	-	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", 44nd 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	12-02-2024		TLM2			
2.	Course Outcomes, Program Outcomes	1	13-02-2024		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	15-02-2024		TLM1	CO1	T1,T2	
4.	Linear Differential equation	1	16-02-2024		TLM1	CO1	T1,T2	
5.	Bernoulli's DE	1	17-02-2024		TLM1	CO1	T1,T2	
6.	Exact DE	1	19-02-2024		TLM1	CO1	T1,T2	
7.	Exact DE	1	20-02-2024		TLM1	CO1	T1,T2	
8.	Non-exact DE Type I	1	22-02-2024		TLM1	CO1	T1,T2	
9.	Non-exact DE Type II	1	23-02-2024		TLM1	CO1	T1,T2	
10.	Non-exact DE Type III	1	24-02-2024		TLM1	CO1	T1,T2	
11.	Non-exact DE Type IV	1	26-02-2024		TLM1	CO1	T1,T2	
12.	Newton's Law of cooling	1	27-02-2024		TLM1	CO1	T1,T2	
13.	Newton's Law of cooling	1	29-02-2024		TLM1	CO1	T1,T2	
14.	Law of natural growth and decay	1	01-03-2024		TLM1	CO1	T1,T2	
15.	Law of natural growth and decay	1	02-03-2024		TLM1	CO1	T1,T2	
16.	Electrical circuits	1	04-03-2024		TLM1	CO1	T1,T2	
17.	TUTORIAL - I	1	05-03-2024		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
18.	Introduction to UNIT II	1	07-03-2024		TLM1	CO1	T1,T2	
19.	Solving a homogeneous DE	1	11-03-2024		TLM1	CO1	T1,T2	
20.	Finding Particular Integral, P.I for e^{ax+b}	1	12-03-2024		TLM1	CO1	T1,T2	
21.	P.I for Cos bx, or sin bx	1	14-03-2024		TLM1	CO1	T1,T2	
22.	P.I for polynomial function	1	15-03-2024		TLM1	CO1	T1,T2	
23.	P.I for $e^{ax+b}v(x)$	1	16-03-2024		TLM1	CO1	T1,T2	

24.	P.I for $x^k v(x)$	1	18-03-2024		TLM1	CO1	T1,T2	
25.	Method of Variation of parameters	1	19-03-2024		TLM1	CO1	T1,T2	
26.	Method of Variation of parameters	1	21-03-2024		TLM1	CO1	T1,T2	
27.	Simultaneous linear equations	1	22-03-2024		TLM1	CO1	T1,T2	
28.	Simultaneous linear equations	1	23-03-2024		TLM1	CO1	T1,T2	
29.	L-C-R circuits	1	26-03-2024		TLM1	CO1	T1,T2	
30.	Simple Harmonic motion	1	28-03-2024		TLM1	CO1	T1,T2	
31.	TUTORIAL - II	1	30-03-2024		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-II		14			No. of classes taken:			

I MID EXAMINATIONS (01-04-2024 TO 06-04-2024)

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
32.	Introduction to Unit III	1	08-04-2024		TLM1	CO2	T1,T2	
33.	Formation of PDE by elimination of arbitrary constants	1	12-04-2024		TLM1	CO2	T1,T2	
34.	Formation of PDE by elimination of arbitrary functions	1	13-04-2024		TLM1	CO2	T1,T2	
35.	Formation of PDE by elimination of arbitrary functions	1	15-04-2024		TLM1	CO2	T1,T2	
36.	Solving of PDE	1	16-04-2024		TLM1	CO2	T1,T2	
37.	Lagrange's Method	1	18-04-2024		TLM1	CO2	T1,T2	
38.	Lagrange's Method	1	19-04-2024		TLM1	CO2	T1,T2	
39.	Homogeneous Linear PDE with constant coefficients	1	20-04-2024		TLM1	CO2	T1,T2	
40.	TUTORIAL - III	1	22-04-2024		TLM3	CO2	T1,T2	
No. of classes required to complete UNIT-III		09			No. of classes taken:			

UNIT-IV: Vector Differentia

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
41.	Introduction to UNIT IV	1	23-04-2024		TLM1	CO3	T1,T2	
42.	Vector Differentiation	1	25-04-2024		TLM1	CO3	T1,T2	
43.	Gradient	1	26-04-2024		TLM1	CO3	T1,T2	
44.	Directional Derivative	1	27-04-2024		TLM1	CO3	T1,T2	
45.	Directional Derivative	1	29-04-2024		TLM1	CO3	T1,T2	

46.	Divergence	1	30-04-2024		TLM1	CO3	T1,T2	
47.	Curl	1	02-05-2024		TLM1	CO3	T1,T2	
48.	Problems	1	03-05-2024		TLM1	CO3	T1,T2	
49.	Solenoidal fields, Irrotational fields, potential surfaces	1	04-05-2024		TLM1	CO3	T1,T2	
50.	Solenoidal fields, Irrotational fields, potential surfaces	1	06-05-2024		TLM1	CO3	T1,T2	
51.	Laplacian, second order operators	1	07-05-2024		TLM1	CO3	T1,T2	
52.	Vector Identities	1	09-05-2024		TLM1	CO3	T1,T2	
53.	Vector Identities	1	10-05-2024		TLM1	CO3	T1,T2	
54.	TUTORIAL IV	1	13-05-2024		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
57.	Introduction to Unit-V	1	14-05-2024		TLM1	CO4	T1,T2	
58.	Line Integral	1	16-05-2024		TLM1	CO4	T1,T2	
59.	Circulation	1	17-05-2024		TLM1	CO4	T1,T2	
60.	Work done	1	18-05-2024		TLM1	CO4	T1,T2	
61.	Surface Integral	1	20-05-2024		TLM1	CO4	T1,T2	
62.	Surface Integral	1	21-05-2024		TLM1	CO4	T1,T2	
63.	Flux	1	23-05-2024		TLM1	CO4	T1,T2	
64.	Green's Theorem	1	24-05-2024		TLM1	CO4	T1,T2	
65.	Green's Theorem	1	25-05-2024		TLM1	CO4	T1,T2	
66.	Stoke's Thoerem	1	27-05-2024		TLM1	CO4	T1,T2	
67.	Divergence Theorem	1	28-05-2024		TLM1	CO4	T1,T2	
68.	TUTORIAL - V	1	30-05-2024		TLM3	CO4	T1,T2	
No. of classes required to complete UNIT-V		12			No. of classes taken:			

Content beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
69.	Non-homogeneous Linear PDE with constant coefficients	2	31-05-2024 01-06-2024		TLM2	CO2	T1,T2	
No. of classes		2			No. of classes taken:			
II MID EXAMINATIONS (03-06-2024 TO 08-06-2024)								

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

Dr. M.Srinivasa Reddy		**Dr. A. RAMI REDDY**	**Dr. A. RAMI REDDY**
Course Instructor	Course Coordinator	Module Coordinator	HOD

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.

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DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. P. Rakesh Kumar **Date**: 07-02-2024

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.:** 2023-24

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	
CO1	Extract electrical variables of AC & DC circuits using fundamental laws. **(Understand)**
CO2	Understand the operation of electrical machines and measuring instruments. **(Understand)**
CO3	Classify various energy resources, safety measures and interpret electricity bill generation in electrical systems. **(Understand)**
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
CO1	3	2	3									1	3	2		2
CO2	2	2												2		3
CO3	2	2				3					2	2	2			
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. 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. Bhatacharya, 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

SI.	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	12-02-2024		TLM1	
2.	Evolution of electronics, Vacuum tubes to nano electronics	1	13-02-2024		TLM1	
3.	Characteristics of PN Junction Diode	1	14-02-2024		TLM1	
4.	Zener Effect — Zener Diode and its Characteristics	1	15-02-2024		TLM1	
5.	Zener Effect — Zener Diode and its Characteristics	1	17-02-2024		TLM1	
6.	Bipolar Junction Transistor	1	19-02-2024		TLM1	
7.	Bipolar Junction Transistor	1	20-02-2024		TLM1	
8.	CB Configurations and Characteristics	1	21-02-2024		TLM2	
9.	CE Configurations and Characteristics.	1	22-02-2024		TLM2	
10.	CC Configurations and Characteristics.	1	24-02-2024		TLM2	
11.	Elementary Treatment of Small Signal CE Amplifier.	1	26-02-2024		TLM1	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Basic Electronic Circuits and Instrumentation

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	**Rectifiers and power supplies**: Block diagram description of a DC power supply	1	27-02-2024		TLM1	
13.	Working of full wave bridge rectifier, capacitor filter (no analysis)	1	28-02-2024		TLM1	
14.	Working of full wave bridge rectifier, capacitor filter (no analysis)	1	29-02-2024		TLM1	
15.	Working of simple Zener voltage regulator.	1	02-03-2024		TLM1	
16.	Working of simple Zener voltage regulator.	1	04-03-2024		TLM2	

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
17.	**Amplifiers**: Block diagram of Public Address system	1	05-03-2024		TLM1	
18.	Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response.	1	06-03-2024		TLM2	
19.	**Electronic Instrumentation:** Block diagram of an electronic instrumentation system.	1	07-03-2024		TLM2	
20.	Electronic Instrumentation: Block diagram of an electronic instrumentation system.	1	11-03-2024		TLM2	
No. of classes required to complete UNIT-II: 10				**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
21.	Overview of Number Systems	1	12-03-2024		TLM1	
22.	Logic gates including Universal Gates	1	13-03-2024		TLM2	
23.	BCD codes	1	14-03-2024		TLM1	
24.	Excess-3 code, gray code	1	16-03-2024		TLM2	
25.	Hamming code	1	18-03-2024		TLM1	
26.	Boolean Algebra	1	19-03-2024		TLM1	
27.	Basic Theorems and properties of Boolean Algebra	1	20-03-2024		TLM1	
28.	Truth Tables and Functionality of Logic Gates NOT, OR, AND, NOR, NAND, XOR and XNOR	1	21-03-2024		TLM1	
29.	Simple combinational circuits	1	23-03-2024		TLM2	
30.	Half and Full Adders	1	26-03-2024		TLM1	
31.	Introduction to sequential circuits	1	27-03-2024		TLM2	
32.	Flip flops	1	28-03-2024		TLM2	
33.	Registers and counters	1	30-03-2024		TLM1	
No. of classes required to complete UNIT-III: 15				**No. of classes taken:**		

I Mid Examinations: 01-04-2024 to 06-04-2024

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
34.	Introduction to Course and Course Outcomes	1	08-04-2024		TLM1	
35.	**DC Circuits:** Electrical circuit elements (R, L and C)	1	10-04-2024		TLM1	
36.	Ohm's Law and its limitations	1	15-04-2024		TLM1	
37.	KCL & KVL	1	16-04-2024		TLM2	
38.	Series, Parallel, series-parallel circuits	1	18-04-2024		TLM1	
39.	Superposition theorem	1	20-04-2024		TLM1	
40.	**AC Circuits:** A.C. Fundamentals:	1	22-04-2024		TLM1	
41.	Equation of AC Voltage and current, waveform	1	23-04-2024		TLM1	

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Time period, frequency, amplitude, phase, phase difference, average value, RMS value	1	24-04-2024		TLM1	
43.	Form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits	1	25-04-2024		TLM1	
44.	Concept of Impedance, Active power, reactive power and apparent power	1	27-04-2024		TLM2	
45.	Concept of power factor (Simple Numerical problems).	1	29-04-2024		TLM1	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Machines and Measuring Instruments

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
46.	**Machines:** Construction, principle and operation of DC Motor	1	30-04-2024		TLM1	
47.	Construction, principle and operation of DC Generator	1	01-05-2024		TLM2	
48.	Construction, principle and operation of Single-Phase Transformer	1	02-05-2024		TLM2	
49.	Construction, principle and operation of Three Phase Induction Motor	1	04-05-2024		TLM2	
50.	Construction, principle and operation of Alternator	1	06-05-2024		TLM1	
51.	Applications of electrical machines	1	07-05-2024		TLM1	
52.	**Measuring Instruments:** Construction and working principle of Permanent Magnet Moving Coil (PMMC)	1	08-05-2024		TLM2	
53.	Moving Iron (MI) Instruments	1	09-05-2024		TLM2	
54.	Wheatstone Bridge	1	11-05-2024		TLM1	
No. of classes required to complete UNIT-II: 09				**No. of classes taken:**		

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

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
55.	**Energy Resources**: Conventional and non-conventional energy resources	1	13-05-2024		TLM1	
56.	Layout and operation of various Power Generation systems: Hydel power generation	1	14-05-2024		TLM1	
57.	Layout and operation of nuclear power generation	1	15-05-2024		TLM1	
58.	Layout and operation of Solar power generation	1	16-05-2024		TLM1	
59.	Layout and operation of Wind power generation.	1	18-05-2024		TLM1	
60.	**Electricity bill:** Power rating of	1	20-05-2024		TLM1	

Sl.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	household appliances including air conditioners PCs, Laptops, Printers, etc.					
61.	Definition of "unit" used for consumption of electrical energy,	1	21-05-2024		TLM1	
62.	Two-part electricity tariff	1	22-05-2024		TLM1	
63.	Calculation of electricity bill for domestic consumers	1	23-05-2024		TLM1	
64.	**Equipment Safety Measures:** Working principle of Fuse and Miniature Circuit Breaker (MCB), merits and demerits.	1	25-05-2024		TLM1	
65.	**Equipment Safety Measures:** Working principle of Fuse and Miniature Circuit Breaker (MCB), merits and demerits.	1	27-05-2024		TLM1	
66.	**Personal Safety Measures**: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.	1	28-05-2024		TLM2	
67.	**Personal Safety Measures**: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.	1	29-05-2024		TLM2	
68.	Introduction to Oscillators Content Beyond Syllabus	1	30-05-2024		TLM2	
69.	Revision of I, II and III Units	1	01-06-2024		TLM6	
No. of classes required to complete UNIT-III: 15				**No. of classes taken:**		

II Mid Examinations: 03-06-2024 to 08-06-2024

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	12-02-2024	30-03-2024	8W
I Mid Examinations	01-04-2024	06-04-2024	1W
II Phase of Instructions	08-04-2024	01-06-2024	8W
II Mid Examinations	03-06-2024	08-06-2024	1W
Preparation and Practicals	10-06-2024	15-06-2024	1W
Semester End Examinations	17-06-2024	29-06-2024	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: 09-02-2024

Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Dr. P. Rakesh Kumar	Dr. P. Rakesh Kumar	Dr. G. Srinivasulu	Dr. Y. Amar Babu

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hodmech@Lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor : Dr. Y. Vijay Bhaskar Reddy

Course Name & Code : Introduction to Programming (23CS01)

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

Program/Sem/Sec : B.Tech. –MECH A.Y.: 2023 – 24

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 data types, control structures, functions, and arrays.
- To encourage collaborative learning and teamwork 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 – Level 4
CO3:	Implement various algorithms using the C programming language.	Apply – Level 3
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 – Level 3

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

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

TEXTBOOKS:

T1: "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988

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, Rema Theraja, 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 COs and CEOs, History of Computers	1	12-02-24			
2.	Basic organization of a Computer: ALU, Input- Output Units	1	13-02-24			
3.	Memory, Program Counter	1	14-02-24			
4.	Introduction to Programming Languages	1	16-02-24			
5.	Basics of a Computer Program – Algorithms	1	17-02-24			
6.	Flowcharts (Using Dia Tool), Pseudo Code	1	19-02-24			
7.	Introduction to Compilation and Execution	1	20-02-24			
8.	Primitive Data Types	1	21-02-24			
9.	Variables and Constants	1	23-02-24			
10.	Basic Input and Output Operations	2	24-02-24 26-02-24			
11.	Type Conversion and Casting	1	27-02-24			
12.	**Problem Solving Techniques:** Algorithmic Approach, Characteristics of Algorithm	2	28-02-24 01-03-24			
13.	**Problem Solving Strategies:** Top-Down Approach, Bottom-Up Approach	1	02-03-24			
14.	Time and space complexities of Algorithms	1	04-03-24			
No. of classes required to complete UNIT – I:16				**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.	**Simple Sequential Programs:**Conditional Statements	1	05-03-24			
16.	if, if-else	1	06-03-24			
17.	switch	1	09-03-24			
18.	Example programs on Decision Making and Branching	1	11-03-24			

19.	**Loops:** while Loop with Examples	2	12-03-24 13-03-24			
20.	do-while Loop with Examples	2	15-03-24 16-03-24			
21.	for Loop with Examples	2	18-03-24 19-03-24			
22.	Break Statement	1	20-03-24			
23.	Continue Statement	1	22-03-24			
No. of classes required to complete UNIT – II: 12				**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
24.	**Arrays:** Introduction to 1D-Arrays,Declaration, and Initialization	1	23-03-24			
25.	1D-Array Indexing, Accessing Elements of 1D-Array	1	26-03-24			
26.	Memory Model, Programs on 1D-Arrays	2	27-03-24 30-03-24			
27.	Introduction to 2D-Arrays,Declaration, and Initialization	1	30-03-24			
28.	2D-Array Indexing, Accessing Elements of 2D-Array	1	08-04-24			
29.	Programs on 2D-Arrays	2	10-04-24 12-04-24			
30.	Introduction to Strings	1	15-04-24			
31.	Reading and Writing Operations on Strings	1	16-04-24			
32.	String Handling Functions	1	19-04-24			
33.	Programs on Strings	2	20-04-24 22-04-24			
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
34.	**Pointers:**Introduction to Pointers	1	23-04-24			
35.	Dereferencing and Address Operators	1	24-04-24			
36.	Pointer and Address Arithmetic	1	26-04-24			
37.	Array Manipulation using Pointers	2	27-04-24 29-04-24			
38.	**User-defined Data Types:**Structure, Declaration, and Initialization	1	30-04-24			
39.	Concepts of Structures	2	01-05-24 03-05-24			
40.	Programs on Structures	1	04-05-24			
41.	Union, Declaration, and Initialization	1	06-05-24			
42.	Concepts of Union	2	07-05-24 08-05-24			
43.	Programs on Union	1	10-05-24			
No. of classes required to complete UNIT – IV:13				**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
44.	**Functions:**Introduction, Function Declaration and Definition	1	13-05-24			

45.	Function Call – Return Types and Arguments	1	14-05-24			
46.	Modifying parameters inside functions using pointers	1	15-05-24			
47.	Arrays as parameters	2	17-05-24 18-05-24			
48.	Recursion and Example	1	20-05-24			
49.	Scope and Lifetime of Variables	2	21-05-24 22-05-24			
50.	**File Handling:**Introduction to Files, Basics of File Handling	1	24-05-24			
51.	File Operations	2	25-05-24 27-05-24			
52.	Example Programs on File Handling	1	28-05-24			
No. of classes required to complete UNIT – V:12				**No. of classes taken:**		

Content Beyond the Syllabus:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
53.	Introduction to Data Structures	1	29-05-24			
54.	Types of Data Structures&	1	31-05-24			
55.	Applications	1	01-06-24			

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
Assignmenton Cycle – I(Units-I, II)	A1=5
MID – IDescriptiveExamination (Units-I, II)	M1=15
MID – I Objective /QuizExamination (Units-I, II)	Q1=10
Mid – I Total Marks: A1 + M1 + Q1	MT1 = 30
Assignment on Cycle – II(Unit-III, IV & V)	A2=5
MID – II Descriptive Examination (UNIT-III, IV & V)	M2=15
MID – II Objective / Quiz Examination (UNIT-III, IV & V)	Q2=10
Mid – II Total Marks: A2 + M2 + Q2	MT2 = 30
ContinuousInternal Evaluation (CIE): 80% of Max (MT1, MT2) + 20% of Min (MT1, MT2)	C = 30
Semester End Examination (SEE): S	S = 70

Total Marks (T) = C + S	T = 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.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr. Y.V. Bhaskar Reddy	Dr. Y.V. Bhaskar Reddy	Dr. Y.V. Bhaskar Reddy	Dr.M.B.S.Sreekara Reddy
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT (PART-A)

Name of Course Instructor	**:** Mr. Jonnala Subba Reddy, Associate 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.**	**:** 2023-24
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 (17ME02)

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**	12-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
02	Introduction, Basic Terminology in Mechanics	**1**	13-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
03	Laws of mechanics	**1**	14-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
04	Force, Characteristics of forces	**1**	15-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
05	Resolution & Composition of Forces	**1**	16-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
06	Numericals	**1**	19-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
07	Numericals	**1**	20-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
08	Systems of Forces: Introduction, Classification	**1**	21-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
09	Coplanar Concurrent Forces, Numericals	**1**	22-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
10	Coplanar Non-Concurrent Forces, Numericals	**1**	23-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
11	Moment of force, applications, Numericals	**1**	26-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
12	Couples, Numericals	**1**	27-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
13	Resultant of Force Systems, Numericals	**1**	28-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
14	Numericals	**1**	29-02-2024		**TLM1**	CO1	T1, T2, R1 to R5	
15	Numericals, Class Test	1	01-03-2024		**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**	04-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
17	Free Body Diagrams, Numericals	**1**	05-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
18	Lami's Theorem, Numericals	**1**	06-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
19	Equations of Equilibrium of Force Systems	**1**	07-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
20	Triangle Law of Forces Numericals	**1**	11-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
21	Polygon Law of Forces, Numericals	**1**	12-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
22	Condition of Equilibrium, Numericals	**1**	13-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
23	Analysis of plane trusses, Numericals	**1**	14-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
24	Principle of Virtual Work with simple examples	**1**	15-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
25	Friction: Introduction, Terminology	**1**	18-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
26	Coulomb's Laws of dry friction, Coefficient of Friction, Cone of Static friction, Numericals	**1**	19-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
27	Limiting friction and impending motion of blocks resting on horizontal planes, Numericals	**1**	20-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
28	Limiting friction and impending motion of blocks resting on inclined planes, Numericals	**1**	21-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
29	Numericals	**1**	22-03-2024		**TLM1**	CO2	T1, T2, R1 to R5	
30	Numericals, Class Test	1	26-03-2024		**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**	27-03-2024		**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**	28-03-2024		**TLM1**	CO3	T1, T2, R1 to R5	
-	**I Mid Examinations**	**1 week**	**01-04-2024 to 06-04-2024**					
33	Numericals on Centroid	**1**	08-04-2024		**TLM1**	CO3	T1, T2, R1 to R5	
34	Numericals on Centroid	**1**	10-04-2024		**TLM1**	CO3	T1, T2, R1 to R5	
35	Numericals on Centre of Gravity	**1**	12-04-2024		**TLM1**	CO3	T1, T2, R1 to R5	
36	Numericals on Centre of Gravity	**1**	15-04-2024		**TLM1**	CO3	T1, T2, R1 to R5	
37	Numericals	**1**	16-04-2024		**TLM1**	CO3	T1, T2, R1 to R5	
38	Area Moments of Inertia: Definition, Moment of inertia of I, T, C, L Sections	**1**	18-04-2024		**TLM1**	CO3	T1, T2, R1 to R5	
39	Polar Moment of Inertia, Transfer Theorem, Numericals	**1**	19-04-2024		**TLM1**	CO3	T1, T2, R1 to R5	
40	Numericals	**1**	22-04-2024		**TLM1**	CO3	T1, T2, R1 to R5	
41	Mass Moment of Inertia: Moment of Inertia of Masses, Numericals	**1**	23-04-2024		**TLM1**	CO3	T1, T2, R1 to R5	
42	Transfer Formula for Mass Moments of Inertia for simple objects, Numericals	**1**	24-04-2024		**TLM1**	CO3	T1, T2, R1 to R5	
43	Numericals	**1**	25-04-2024		**TLM1**	CO3	T1, T2, R1 to R5	
44	Numericals	**1**	26-04-2024		**TLM1**	CO3	T1, T2, R1 to R5	
45	Numericals, Class Test	1	27-04-2024		**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**	29-04-2024		**TLM1**	CO4	T1, T2, R1 to R5	
47	General Principles in Dynamics, Numericals	**1**	30-04-2024		**TLM1**	CO4	T1, T2, R1 to R5	
48	Rectilinear Motion - Motion with Uniform Velocity, Uniform Acceleration and Non-Uniform Acceleration	**1**	01-05-2024		**TLM1**	CO4	T1, T2, R1 to R5	
49	Numericals	**1**	02-05-2024		**TLM1**	CO4	T1, T2, R1 to R5	
50	Curvilinear Motion - Motion with Uniform Velocity, Uniform Acceleration and Non-Uniform Acceleration	**1**	03-05-2024		**TLM1**	CO4	T1, T2, R1 to R5	
51	Numericals	**1**	07-05-2024		**TLM1**	CO4	T1, T2, R1 to R5	
52	D'Alembert's Principle, Numericals	**1**	08-05-2024		**TLM1**	CO4	T1, T2, R1 to R5	
53	Work Energy method and applications to particle motion, Numericals	**1**	09-05-2024		**TLM1**	CO4	T1, T2, R1 to R5	
54	Numericals	**1**	10-05-2024		**TLM1**	CO4	T1, T2, R1 to R5	
55	Impulse Momentum method (theory only)	**1**	11-05-2024		**TLM1**	CO4	T1, T2, R1 to R5	
56	Numericals	**1**	13-05-2024		**TLM1**	CO4	T1, T2, R1 to R5	
57	Numericals, Class Test	**1**	14-05-2024		**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**	15-05-2024		**TLM1**	CO5	T1, T2, R1 to R5	
59	Numericals	**1**	16-05-2024		**TLM1**	CO5	T1, T2, R1 to R5	
60	Rotation about fixed axis, Numericals	**1**	17-05-2024		**TLM1**	CO5	T1, T2, R1 to R5	
61	Numericals	**1**	20-05-2024		**TLM1**	CO5	T1, T2, R1 to R5	
62	Plane Motion - Numericals	**1**	21-05-2024		**TLM1**	CO5	T1, T2, R1 to R5	
63	Numericals	**1**	22-05-2024		**TLM1**	CO5	T1, T2, R1 to R5	
64	Work Energy method and simple applications, Numericals	**1**	23-05-2024		**TLM1**	CO5	T1, T2, R1 to R5	
65	Impulse Momentum method and simple applications, Numericals	**1**	24-05-2024		**TLM1**	CO5	T1, T2, R1 to R5	
66	Numericals, Class Test	**1**	27-05-2024		**TLM3**	CO5	T1, T2, R1 to R5	
67	Revision of I Unit and II Unit	**1**	28-05-2024		**TLM 1 to 6**	CO5	T1, T2, R1 to R5	
68	Revision of III Unit	**1**	29-05-2024		**TLM 1 to 6**	CO5	T1, T2, R1 to R5	
69	Revision of IV Unit	**1**	30-05-2024		**TLM 1 to 6**	CO5	T1, T2, R1 to R5	
70	Revision of V Unit	**1**	31-05-2024		**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 & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

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

Commencement of Class work		**12-02-2024**	
Description	**From**	**To**	**Weeks**
I Phase of Instructions	12-02-2024	06-04-2024	8 Weeks
I Mid Examinations	01-04-2024	06-04-2024	1 Week
II Phase of Instructions	08-04-2024	01-06-2024	8 Weeks
II Mid Examinations	03-06-2024	08-06-2024	1 Week
Preparation and Practicals	10-06-2024	15-06-2024	1 Week
Semester End Examinations	17-06-2024	29-06-2024	1 Week
Commencement of Next (III) Semester Class Work		**01-07-2024**	

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

↓Day/Date→	09.00 – 09.50	09.50 - 10.40	10.50 - 11.40	11.40 - 12.30	12.30 - 13.30	13.30 - 14.20	14.20 - 15.10	15.10 - 16.00
Monday		EM			LUNCH BREAK			
Tuesday			EM					
Wednesday	EM							
Thursday		EM Lab					EM	
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	**Mr. J. Subba Reddy**	**Mr. J. Subba Reddy**	**Dr. B. Sudheer Kumar**	**Dr. M. B. S. Srikar Reddy**
Signature				

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DEPARTMENT OF FRESHMAN ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. Lakshmi V R Babu Syamala
Course Name & Code : Engineering Chemistry Lab & 23FE54
L-T-P Structure : **0-0-3** **Credits:1.5**
Program/Sem/Sec : B.Tech./Sem-II/ME **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): ME

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	17-02-2024		TLM1		
2.	Preparation of a Bakelite	3	24-02-2024		TLM4	CO1	
3.	Determination of amount of HCl using standard Na_2CO_3 solution	3	02-03-2024		TLM4	CO1	
4.	Determination of Strength of an acid in Pb-Acid battery	3	09-03-2024		TLM4	CO1	
5.	Estimation of Ferrous Iron by Dichrometry	3	16-03-2024		TLM4	CO1	
6.	Estimation of Ferrous Iron by Permanganometry	3	23-03-2024		TLM4	CO1	
7.	Determination of hardness of a groundwater sample.	3	30-03-2024		TLM4	CO1	
8.	Determination of calorific value of gases by Junker's gas calorimeter.	3	13-04-2024		TLM4	CO1	
9.	Determination of viscosity of lubricating oil by Redwood Viscometer-1 &2	3	20-04-2024		TLM4	CO2	
10.	Preparation of nanomaterials by precipitation method	3	27-04-2024		TLM4	CO5	
11.	Additional experiment/repeat	3	04-05-2024		TLM4	CO1	
12.	Additional experiment/repeat	3	11-05-2024		TLM4	CO1	
13.	Additional experiment/repeat	3	18-05-2024		TLM4	CO1	
13.	Internal Exam	3	28-05-2024 & 01-06-2024		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 R23 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	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr. Lakshmi V R Babu Syamala**	**Dr.V.Parvathi**	**Dr.V.Parvathi**	**Dr.A.Rami Reddy**
Signature				

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Phone: 08659-222933, **Fax**: 08659-222931

DEPARTMENT OF ECE

LAB HANDOUT

PART-A

Date: 09-02-2024

Name of Course Instructor : Dr. P. Rakesh Kumar, Mr. M. Siva Sankara Rao, Mr. Ch. Mallikharjuna Rao, Mr. P. James Vijay

Course Name & Code : Electrical & Electronics Engineering Workshop (E & EE WS)

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

Program/Sem : B.Tech., MECH., II Sem **A.Y.** : 2023-24

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
CO1	3	2						2	3	2		1				
CO2	2	2		2				2	2	2						
CO3	2	2	2	2				2	2	2				2		
CO4	2	2		3				2	3	2		1	2			
CO5	3	2			2			2	2	2	1	1	2	2	3	2
CO6	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	16-02-2024		TLM4	
2.	Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.	3	23-02-2024		TLM4	
3.	Implementation of half wave and full wave rectifiers	3	01-03-2024		TLM4	
4.	Plot Input & Output characteristics of BJT in CB configuration-04	3	15-03-2024		TLM4	
5.	Frequency response of CE amplifier.	3	22-03-2024		TLM4	
6.	Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs	3	12-04-2024		TLM4	
7.	Internal Lab Examination (**Electronics**)	3	19-04-2024		TLM4	
8.	Verification of KCL and KVL	3	26-04-2024		TLM4	
9.	Verification of Superposition Theorem/ Measurement of Resistance using Wheat stone bridge	3	03-05-2024		TLM4	
10.	Magnetization Characteristics of DC Shunt Generator	3	10-05-2024		TLM4	
11.	Measurement of Power and Power factor using Single-phase wattmeter	3	17-05-2024		TLM4	
12.	Calculation of Electrical Energy for Domestic Premises	3	24-05-2024		TLM4	
13.	Internal Lab Examination (**Electricals**)	3	31-05-2024		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 (R23 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	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 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: 09-02-2024

Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Dr. P. Rakesh Kumar	Dr. P. Rakesh Kumar	Dr. G. Srinivasulu	Dr. Y. Amar Babu

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor : Dr. Y. Vijay Bhaskar Reddy /Ms.K.Eswaree Devi

Course Name & Code : Computer Programming Lab (23CS51)

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

Program/Sem/Sec : B.Tech. –MECH / II Sem. A.Y.: 2023 – 24

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 – Level 3
CO2:	Select the right control structure for solving the problem. (Apply)	Apply – Level 3
CO3:	Develop C programs which utilize memory efficiently using programming constructs like pointers. (Apply)	Apply – Level 3
CO4:	Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C. (Apply).	Apply – Level 3
CO5:	Improve individual / teamwork skills, communication and report writing skills with ethical values.	

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Programs to be covered	No. of Classes		Date of Completion	Delivery Method
		Required as per the Schedule	Taken		
1.	Week – 1 and Week – 2	06	14/02/24 21/02/24		DM5
2.	Week – 3	03	28/02/24		DM5
3.	Week – 4 and Week – 5	03	06/03/24		DM5
4.	Week – 6	03	13/03/24		DM5
5.	Week – 7	03	20/03/24		DM5
6.	Week – 8	03	27/03/24		DM5
7.	Week – 9	03	10/04/24		DM5
8.	Week – 10	03	24/04/24		DM5
9.	Week – 11	03	01/05/24		DM5
10.	Week – 12	03	08/05/24		DM5
11.	Week – 13	03	15/05/24		DM5
12.	Week – 14	03	22/05/24		DM5
13.	Internal Lab Exam	03	29/05/24		DM4

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):

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.
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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
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PO8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
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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.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. Y.V. Bhaskar Reddy**	**Dr. Y.V. Bhaskar Reddy**	**Dr. Y.V. Bhaskar Reddy**	**Dr.M.B.S.Sreekara Reddy**
Signature				

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor(s): **Jonnala Subba Reddy (T668),**
Dr. Ch. Siva Sankar Babu (T571),
Mr. V. Sankar Rao (T721)

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.**	**:** 2023-24
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 09.50 AM – 12.30 PM)

Batch size:

S.No	Batches	Regd. Nos	Total No. of Students
01	Section A	23761A0301 – 312, 314 – 321, 322 - 364	62

Division of Batches:

Batch No	Regd. No of students	Batch size
A1	23761A0301 – 305	05
A2	23761A0306 – 310	05
A3	23761A0311 – 312, 314 - 317	05
A4	23761A0318 – 321, 322	05
A5	23761A0323 – 327	05
A6	23761A0328 – 332	05

Batch No	Regd. No of students	Batch size
A7	23761A0333 – 337	05
A8	23761A0338 – 342	05
A9	23761A0343 – 347	05
A10	23761A0348 – 352	05
A11	23761A0353 – 358	06
A12	23761A0359 – 364	06

List of Experiments:

1. Verification of Law of Parallelogram of Forces. (Ex 1)
2. Verification of Law of Triangle of Forces. (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. Determination of coefficient of Static and Rolling Frictions (Ex 4)
5. Determination of Centre of Gravity of different shaped Plane Lamina. (Ex 5)
6. 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 6)
7. Study of the systems of pulleys and draw the free body diagram of the system. (Ex 7)
8. Determine the acceleration due to gravity using a compound pendulum. (Ex 8)
9. 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 9)
10. Determine the Moment of Inertia of a Flywheel. (Ex 10)
11. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever. (Ex 11)
12. Verification of Work Energy and Impulse Momentum methods. (Ex 12)

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	**15-02-2024**		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 Parallelogram of Forces	3	**22-02-2024**		TLM4	
03	Verification of Law of Triangle of Forces	3	**29-02-2024**		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	**07-03-2024**		TLM4	
05	Determination of coefficient of Static and Rolling Frictions	3	**14-03-2024**		TLM4	
06	Determination of Centre of Gravity of different shaped Plane Lamina	3	**21-03-2024**		TLM4	
07	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	**28-03-2024**		TLM4	
I Mid Exams: 01-04-2024 to 06-04-2024						
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	Study of the systems of pulleys and draw the free-body diagram of the system	3	**18-04-2024**		TLM4	
09	Determine the acceleration due to gravity using a compound pendulum	3	**25-04-2024**		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	**02-05-2024**		TLM4	
11	Determine the Moment of Inertia of a Flywheel	3	**09-05-2024**		TLM4	
12	Verification of the Law of Moment using Rotation Disc Apparatus and Bell Crank Lever	3	**16-05-2024**		TLM4	
13	Verification of Work Energy and Impulse Momentum methods	3	**23-05-2024**		TLM4	
14	Internal Exam and Viva - Voce	3	**30-05-2024**		TLM4	
II Mid Exams: 03-06-2024 to 08-06-2024						

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 VI Semester Classwork	**12-02-2024**		
Description	**From**	**To**	**Weeks**
I Phase of Instructions	12-02-2024	06-04-2024	8 Weeks
I Mid Examinations	01-04-2024	06-04-2024	1 Week
II Phase of Instructions	08-04-2024	01-06-2024	8 Weeks
II Mid Examinations	03-06-2024	08-06-2024	1 Week
Preparation and Practicals	10-06-2024	15-06-2024	1 Week
Semester End Examinations	17-06-2024	29-06-2024	1 Week
Commencement of VII Semester Classwork	**01 – 07 - 2024**		

Schedule of Experiments:

Date	Batch											
	A1	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**	**A9**	**A10**	**A11**	**A12**
15-02-2024	Introduction to Engineering Mechanics Lab - Demonstration of Experiments											
22-02-2024	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 11	Ex 12
29-02-2024	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 11	Ex 12	Ex 1
07-03-2024	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 11	Ex 12	Ex 1	Ex 2
14-03-2024	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 11	Ex 12	Ex 1	Ex 2	Ex 3
21-03-2024	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 11	Ex 12	Ex 1	Ex 2	Ex 3	Ex 4
28-03-2024	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 11	Ex 12	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5
18-04-2024	Ex 7	Ex 8	Ex 9	Ex 10	Ex 11	Ex 12	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6
25-04-2024	Ex 8	Ex 9	Ex 10	Ex 11	Ex 12	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7
02-05-2024	Ex 9	Ex 10	Ex 11	Ex 12	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8
09-05-2024	Ex 10	Ex 11	Ex 12	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9
16-05-2024	Ex 11	Ex 12	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10
23-05-2024	Ex 12	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 11
30-05-2024	**Internal Exam**											

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

↓Day/Date→	09.00 –	09.50 -	10.50 -	11.40 -	12.30 -	13.30 -	14.20 -	15.10 -
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)**	**Mr. Jonnala Subba Reddy (T668)** **Dr. Ch. Siva Shankar Babu (T571)** **Mr. V. Sankar Rao (T721)**

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…	A = 10
Record = **B**	1,2,3,4,5,6,7,8	B = 05
Internal Test / Viva = **C**	1,2,3,4,5,6,7,8	C = 15
Cumulative Internal Examination: A + B + C = 30	1,2,3,4,5,6,7,8	**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	**D = 70**
Total Marks: A + B + C + D = 100	1,2,3,4,5,6,7,8	**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	**Mr. J. Subba Reddy / Dr. Ch.Siva Sankar Babu / Mr. V. Sankar Rao**	**Dr. B.Sudheer Kumar**	**Dr. B.Sudheer Kumar**	**Dr.M.B.S.Sreekara Reddy**
Designation	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**HOD**