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 FRESHMANENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. Lakshmi V R BabuSyamala
Course Name & Code **:**Chemistry& 23FE06
L-T-P Structure **:3-0-0** **Credits:03**
Program/Sem/Sec : B.Tech./Sem-II/ASE **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): ASE

UNIT-I: Water Technology

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to CO's, PO's of EC	1	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	16-02-2024 & 20-02-2024		TLM1	
5.	Scale and sludge, Caustic embrittlement	2	21-02-2024 & 22-02-2024		TLM1	
6.	Industrial water treatment	1	23-02-2024		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	01-03-2024		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	12-03-2024		TLM1	
5.	Fuel cells-Basic Concepts, principle and working of hydrogen-oxygen Fuel cell.	1	13-03-2024		TLM1	
6.	Corrosion-Introduction, Classification, corrosion, electrochemical theory of corrosion	1	14-03-2024		TLM1	
7.	Metal oxide formation by dry electrochemical corrosion, Pilling Bed-worth ratios and uses	1	15-03-2024		TLM2	
8.	differential aeration cell corrosion, galvanic corrosion	1	19-03-2024		TLM2	
9.	Factors affecting the corrosion, cathodic and anodic protection	1	20-03-2024		TLM2	
10.	electroplating and electro less plating (Nickel and Copper)	2	21-03-2024 & 22-03-2024		TLM2	
11.	Revision and assignment	1	26-03-2024		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	27-03-2024		TLM1	
2.	Mechanism of chain growth and step growth polymerization	1	28-03-2024		TLM1	
3.	Plastics –Thermo and Thermosetting plastics-Preparation, properties and applications of –Polystyrene, PVC, Teflon	1	10-04-2024		TLM1	
4.	Preparation, properties and applications of –Bakelite, Nylon-6,6,	1	12-04-2024		TLM1	
5.	Elastomers–Buna-S, Buna-N, Thiokol rubbers–preparation, properties and applications	2	16-04-2024 & 18-04-2024		TLM1	

6.	Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value;	1	19-04-2024		TLM1	
7.	Analysis of coal (Proximate and Ultimate analysis)	1	23-04-2024		TLM1	
8.	Liquid Fuels, refining of petroleum, Octane and Cetane number	1	24-04-2024		TLM1	
9.	Alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.	1	25-04-2024			
10.	Revision and assignment	1	26-04-2024		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	30-04-2024 & 01-05-2024		TLM1	
2.	Properties and Engineering applications of composites	1	02-05-2024		TLM1	
3.	Refractories- Classification, Properties, Factors affecting the refractory materials and Applications	2	03-05-2024 & 07-05-2024		TLM1	
4.	Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index	1	08-05-2024		TLM1	
5.	Flash point, Fire point, Cloud point, saponification and Applications	1	09-05-2024		TLM1	
6.	Building materials- Portland Cement, constituents.	1	10-05-2024		TLM1	
7.	Setting and Hardening of cement.	1	14-05-2024		TLM1	
8.	Revision and assignment	1	15-05-2024		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	16-05-2043		TLM1	
2.	Nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method)	2	17-05-2024 & 21-05-2024		TLM1	
3.	Chemical and biological methods of preparation of nanometals and metal oxides	2	22-05-2024 & 23-05-2024		TLM1	
4.	Stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir)	2	24-05-2024 & 28-05-2024		TLM1	
5.	BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors,	2	29-05-2024 & 30-05-2024		TLM1	
9.	Revision and assignment	1	31-05-2024		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	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 (R20 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**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., ASE
ACADEMIC YEAR	**:** 2023-24
COURSE NAME & CODE	**:** Differential Equations & Vector Calculus
L-T-P STRUCTURE	**:** 3-0-0
COURSE CREDITS	**:** 3
COURSE INSTRUCTOR	**:** Dr. K.Bhanu lakshmi
COURSE COORDINATOR	**:** Dr. K.R. Kavitha
PRE-REQUISITES	**:** Basics of Vectors**,** Differentiation, Integration

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

COURSE OUTCOMES (COs)

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

CO1: Solve the differential equations related to various engineering fields – **L3**

CO2: Apply knowledge of partial differentiation in modeling and solving of Partial differential equations – **L3**

CO3: Interpret the physical meaning of different operators such as gradient, curl and divergence – **L3**

CO4: Evaluate the work done against a field, circulation and flux using Vector Calculus – **L3**

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

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

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

BOS APPROVED TEXT BOOKS:

T1 Dr. B.S. Grewal, "Higher Engineering Mathematics", 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	13-02-2024		TLM2			
2.	Course Outcomes, Program Outcomes	1	14-02-2024		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	20-02-2024		TLM1	CO1	T1,T2	
7.	Exact DE	1	21-02-2024		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	27-02-2024		TLM1	CO1	T1,T2	
12.	Newton's Law of cooling	1	28-02-2024		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	05-03-2024		TLM1	CO1	T1,T2	
17.	TUTORIAL - I	1	06-03-2024		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	09-03-2024		TLM1	CO1	T1,T2	
20.	Solving a homogeneous DE	1	12-03-2024		TLM1	CO1	T1,T2	
21.	Finding Particular Integral, P.I for e^{ax+b}	1	13-03-2024		TLM1	CO1	T1,T2	
22.	P.I for Cos bx, or sin bx	1	14-03-2024		TLM1	CO1	T1,T2	
23.	P.I for polynomial function	1	15-03-2024		TLM1	CO1	T1,T2	

24.	P.I for $e^{ax+b}v(x)$	1	16-03-2024		TLM1	CO1	T1,T2	
25.	P.I for $x^k v(x)$	1	19-03-2024		TLM1	CO1	T1,T2	
26.	Method of Variation of parameters	1	20-03-2024		TLM1	CO1	T1,T2	
27.	Method of Variation of parameters	1	21-03-2024		TLM1	CO1	T1,T2	
28.	Simultaneous linear equations	1	22-03-2024		TLM1	CO1	T1,T2	
29.	Simultaneous linear equations	1	23-03-2024		TLM1	CO1	T1,T2	
30.	L-C-R circuits	1	26-03-2024		TLM1	CO1	T1,T2	
31.	Simple Harmonic motion	1	27-03-2024		TLM1	CO1	T1,T2	
32.	TUTORIAL - II	1	28-03-2024		TLM3	CO1	T1,T2	
33.	Revision	1	30-03-2024		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-II		15			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
34.	Introduction to Unit III	1	10-04-2024		TLM1	CO2	T1,T2	
35.	Formation of PDE by elimination of arbitrary constants	1	12-04-2024		TLM1	CO2	T1,T2	
36.	Formation of PDE by elimination of arbitrary functions	1	12-04-2024		TLM1	CO2	T1,T2	
37.	Formation of PDE by elimination of arbitrary functions	1	13-04-2024		TLM1	CO2	T1,T2	
38.	Solving of PDE	1	16-04-2024		TLM1	CO2	T1,T2	
39.	Lagrange's Method	1	18-04-2024		TLM1	CO2	T1,T2	
40.	Lagrange's Method	1	19-04-2024		TLM1	CO2	T1,T2	
41.	Homogeneous Linear PDE with constant coefficients	1	20-04-2024		TLM1	CO2	T1,T2	
42.	TUTORIAL - III	1	23-04-2024		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
43.	Introduction to UNIT IV	1	24-04-2024		TLM1	CO3	T1,T2	
44.	Vector Differentiation	1	25-04-2024		TLM1	CO3	T1,T2	
45.	Gradient	1	26-04-2024		TLM1	CO3	T1,T2	

46.	Directional Derivative	1	27-04-2024		TLM1	CO3	T1,T2	
47.	Directional Derivative	1	30-04-2024		TLM1	CO3	T1,T2	
48.	Divergence	1	01-05-2024		TLM1	CO3	T1,T2	
49.	Curl	1	02-05-2024		TLM1	CO3	T1,T2	
50.	Problems	1	03-05-2024		TLM1	CO3	T1,T2	
51.	Solenoidal fields, Irrotational fields, potential surfaces	1	04-05-2024		TLM1	CO3	T1,T2	
52.	Solenoidal fields, Irrotational fields, potential surfaces	1	07-05-2024		TLM1	CO3	T1,T2	
53.	Laplacian, second order operators	1	08-05-2024		TLM1	CO3	T1,T2	
54.	Vector Identities	1	09-05-2024		TLM1	CO3	T1,T2	
55.	Vector Identities	1	10-05-2024		TLM1	CO3	T1,T2	
56.	TUTORIAL IV	1	11-05-2024		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	15-05-2024		TLM1	CO4	T1,T2	
59.	Circulation	1	16-05-2024		TLM1	CO4	T1,T2	
60.	Work done	1	17-05-2024		TLM1	CO4	T1,T2	
61.	Surface Integral	1	18-05-2024		TLM1	CO4	T1,T2	
62.	Surface Integral	1	21-05-2024		TLM1	CO4	T1,T2	
63.	Flux	1	22-05-2024		TLM1	CO4	T1,T2	
64.	Green's Theorem	1	23-05-2024		TLM1	CO4	T1,T2	
65.	Green's Theorem	1	24-05-2024		TLM1	CO4	T1,T2	
66.	Stoke's Thoerem	1	25-05-2024		TLM1	CO4	T1,T2	
67.	Divergence Theorem	1	28-05-2024		TLM1	CO4	T1,T2	
68.	TUTORIAL - V	1	29-05-2024		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	30-05-2024 31-05-2024		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. K.Bhanu lakshmi	**Dr. K.R. Kavitha**	**Dr. A. RAMI REDDY**	**Dr. A. RAMI REDDY**
Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Ms.K.S.L.Lavanya
Course Name & Code : BASIC ELECTRICAL & ELECTRONICS ENGINEERING – 23EE01
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Branch/Sem/Sec: B.Tech/ASE/II **A.Y.:** 2023-24

Pre-requisites: Physics
Course Educational Objective:

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.

- 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
CO1	Extract electrical variables of AC & DC circuits usin 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 sysems.
	PART-B
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)**

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – IV: SEMICONDUCTOR DEVICES

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

UNIT – V: BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
11.	Introduction	1	27-02-2024		TLM1	
12.	Block diagram description of a dc power supply.	1	28-02-2024		TLM1	
13.	working of a full wave bridge rectifier	1	29-02-2024		TLM1	
14.	capacitor filter	1	2-03-2024		TLM1	
15.	working of simple zener voltage regulator	1	4-03-2024		TLM1	
16.	Block diagram of Public Address system	1	5-03-2024		TLM1	
17.	Circuit diagram and working of common emitter (RC coupled) amplifier	1	6-3-2024		TLM1	
18.	Frequency response.	1	7-3-2024		TLM1	
19.	Electronic Instrumentation	1	11-3-2024		TLM1	
20.	Block diagram of an electronic instrumentation system	1	12-3-2024		TLM1	
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

UNIT – VI: DIGITAL ELECTRONICS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
54.	Overview of Number Systems	1	13-03-2024		TLM2	
55.	Conversion of Number system	1	14-03-2024		TLM2	
56.	Logic gates	1	16-03-2024		TLM1	

57.	BCD & XS-3 code	1	18-03-2024		TLM2	
58.	Gray and Hamming code	1	19-03-2024		TLM1	
59.	Basic theorems	1	20-03-2024		TLM2	
60.	Properties of Boolean Algebra	1	21-03-2024		TLM1	
61.	Logic diagrams using logic gates only	1	23-03-2024		TLM2	
62.	Combinational Vs Sequential circuits	1	26-03-2024		TLM1	
63.	Half adder	1	27-03-2024		TLM1	
64.	Full adder	1	28-03-2024		TLM1	
65.	Introduction to sequential circuits,	1	30-03-2024		TLM1	
66.	Flip flops- SR & D	1	8-4-2024		TLM2	
67.	Flip flops- JK & T	1	9-4-2024		TLM2	
68.	Registers	1	10-4-2024		TLM1	
69.	Counters	1	11-04-2024		TLM1	
No. of classes required to complete UNIT-V: 16				**No. of classes taken:**		

PARTA

UNIT-I: DC & AC CIRCUITS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
21.	Electrical circuit elements	1	13-04-2024		TLM1	
22.	Ohm's Law and its limitations	1	15-04-2024		TLM1	
23.	KCL & KVL	1	16-04-2024		TLM1	
24.	series, parallel, series-parallel circuits	1	18-04-2024		TLM1	
25.	Problems	1	20-04-2024		TLM1	
26.	Super Position theorem	1	22-04-2024		TLM1	
27.	Problems	1	23-04-2024		TLM1	
28.	Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference	1	24-04-2024		TLM2	
29.	average value, RMS value, form factor, peak factor	1	25-04-2024		TLM1	
30.	RLC Circuits	1	27-04-2024		TLM1	
31.	Impedance, Power	1	29-04-2024		TLM1	
32.	Problems	1	30-04-2024		TLM1	
33.	Problems	1	1-05-2024		TLM1	
No. of classes required to complete UNIT-I: 13				**No. of classes taken:**		

UNIT – II: MACHINES AND MEASURING INSTRUMENTS

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.	Construction, principle and operation of (i) DC Motor, (ii) DC Generator.	1	2-05-2024		TLM2	
35.	Single Phase Transformer	1	4-05-2024		TLM2	
36.	Three Phase Induction Motor	1	6-05-2024		TLM2	
37.	Alternator	1	7-05-2024		TLM2	
38.	Applications of electrical machines	1	8-05-2024		TLM2	
39.	Construction and working	1	9-05-2024		TLM2	

	principle of Permanent Magnet Moving Coil (PMMC)					
40.	Moving Iron (MI) Instruments	1	11-05-2024		TLM2	
41.	Wheat Stone bridge	1	13-05-2024		TLM2	
42.	Problems	1	14-05-2024		TLM2	
No. of classes required to complete UNIT-II: 09				**No. of classes taken:**		

UNIT – III: ENERGY RESOURCES, ELECTRICITY BILL & SAFETY MEASURES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
43.	Conventional and non-conventional energy resources	1	15-05-2024		TLM2	
44.	Hydel power generation	1	16-05-2024		TLM2	
45.	Nuclear power plant	1	18-05-2024		TLM2	
46.	Solar & Wind power plants	1	20-05-2024		TLM2	
47.	Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc.	1	21-05-2024		TLM2	
48.	Definition of "unit" used for consumption of electrical energy, two-part electricity tariff,	1	22-05-2024		TLM2	
49.	calculation of electricity bill for domestic consumers.	1	23-05-2024		TLM2	
50.	Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.	1	25-05-2024		TLM2	
51.	Personal safety measures: Electric Shock	1	27-05-2024		TLM2	
52.	Earthing and its types	1	28-05-2024		TLM2	
53.	Safety Precautions to avoid shock.	1	29-05-2024		TLM2	
54.	revision	2	30-05-2024 & 1-6-2024		TLM2	
No. of classes required to complete UNIT-III: 11				**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, III)	A1=5
I-Descriptive Examination (Units-I, II, III)	M1=15
I-Quiz Examination (Units-I, II, III)	Q1=10
Assignment-II (Units-IV, V, VI)	A2=5
II- Descriptive Examination (Units-IV, V, VI)	M2=15
II-Quiz Examination (Units-IV, V, VI)	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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1: To apply the knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in the Aerospace vehicle design.

PSO2: To prepare the students to work effectively in Aerospace and Allied Engineering organizations.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Ms.K.S.L.Lavanya**	**Dr. A.V.G.A.MARTHANDA**	**Dr.G.NAGESWARA RAO**	**Dr.J.S.V.PRASAD**
Signature				

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DEPARTMENT OF AEROSPACE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor	**: Mr. V. V. Krishna Reddy**	
Course Name & Code	**: Introduction to Programming (23CS01)**	
L-T-P Structure	**: 3-0-0**	**Credits: 3**
Program/Sem/Sec	**: B.Tech.–ASE /II Sem**	**A.Y.: 2023-24**

PRE-REQUISITE: Fundamentals of Mathematics.

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:	Understand the features of C language.	Understand –Level 2
CO3:	Interpret the problem and develop an algorithm to solve it.	Apply – Level 3
CO4:	Implement various algorithms using the C programming language.	Apply – Level 3
CO5:	Develop skills required for problem-solving and optimizing 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	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
1 – Low							**2 –** Medium						**3 –** High		

TEXTBOOKS:

T1: The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall, 1988dition, 2015

T2: Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

REFERENCE BOOKS:

R1: Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.

R2: Programming in C, Reema Thareja, Oxford, 2016, 2nd edition

R3: C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I: Introduction to Programming and Problem Solving

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Discussion of CEO's and CO's	1	13-02-2024		**TLM1/ TLM2**	
2.	History of Computers	1	15-02-2024		TLM1/ TLM2	
3.	Basic organization of a computer: ALU, input-output units.	2	16-02-2024 17-02-2024		TLM1/ TLM2	
4.	Memory, program counter	1	19-02-2024		TLM1/ TLM2	
5.	Introduction to Programming Languages,	1	20-02-2024		TLM1/ TLM2	
6.	Basics of a Computer Program-Algorithms	1	22-02-2024		TLM1/ TLM2	
7.	Flowcharts, pseudo code.	1	23-02-2024		TLM1/ TLM2	
8.	Compilation and Execution	1	24-02-2024		TLM1/ TLM2	
9.	Primitive Data Types	2	26-02-2024 27-02-2024		TLM1/ TLM2	
10.	Variables, and Constants, Basic Input and Output operations	2	29-02-2024 01-03-2024		TLM1/ TLM2	
11.	Type Conversion, and Casting	1	02-03-2024		TLM1/ TLM2	
12.	**Problem solving techniques:** Algorithmic approach, characteristics of algorithm	1	04-03-2024		TLM1/ TLM2	
13.	Top-down approach, Bottom-up approach	1	05-03-2024		TLM1/ TLM2	
14	Time and space complexities	1	07-03-2024		TLM1/ TLM2	
No. of classes required to complete UNIT – I: 17				**No. of classes taken:**		

UNIT – II: Control Structures

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Conditional Statements	1	09-03-2024		**TLM1/ TLM2**	
16.	if, if-else, nested if-else , else-if ladder	2	11-03-2024 12-03-2024		**TLM1/ TLM2**	
17.	switch	1	14-03-2024		**TLM1/ TLM2**	
18.	Example programs on Decision Making and Branching	2	15-03-2024 16-03-2024		**TLM1/ TLM2**	
19.	Loops: while , Example programs	2	18-03-2024 19-03-2024		**TLM1/ TLM2**	
20.	do-while, for	1	21-03-2024		**TLM1/ TLM2**	
21.	Example programs on Loops	1	22-03-2024		**TLM1/ TLM2**	
22.	Break and Continue	1	23-03-2024		**TLM1/ TLM2**	
23.	Example programs on Patterns	2	26-03-2024 28-03-2024		**TLM1/ TLM2**	
24.	Revision	1	30-03-2024			
No. of classes required to complete UNIT – II: 14				**No. of classes taken:**		

UNIT – III: Arrays and Strings

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
25.	Arrays Introduction, Declaration	1	08-04-2024		TLM1/ TLM2	
26.	Array indexing, Accessing elements	1	12-04-2024		TLM1/ TLM2	
27.	memory model	1	13-04-2024		TLM1/ TLM2	
28.	programs with array of integers	1	15-04-2024		TLM1/ TLM2	
29.	Introduction to two dimensional arrays	1	16-04-2024 18-04-2024		TLM1/ TLM2	
30.	2D Array indexing, Accessing elements	1	19-04-2024		TLM1/ TLM2	
31.	programs with 2D arrays	1	20-04-2024		TLM1/ TLM2	
32.	Introduction to Strings	1	22-04-2024		TLM1/ TLM2	
33.	Reading and Writing Operations on Strings	1	23-04-2024		TLM1/ TLM2	
34.	String Handling Functions	2	25-04-2024 26-04-2024		TLM1/ TLM2	
35.	Example Programs using Strings	2	27-04-2024 29-04-2024		TLM1/ TLM2	
No. of classes required to complete UNIT – III: 12				**No. of classes taken:**		

UNIT – IV: Pointers & User Defined Data types

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Introduction to Pointers	1	30-04-2024		TLM1/ TLM2	
37.	dereferencing and address operators	1	02-05-2024		TLM1/ TLM2	
38.	pointer and address arithmetic	1	03-05-2024		TLM1/ TLM2	
39.	array manipulation using pointers	2	04-05-2024 06-05-2024		TLM1/ TLM2	
40.	User-defined data types	1	07-05-2024		TLM1/ TLM2	
41.	Structures , Definition and Initialization	2	09-05-2024 10-05-2024		TLM1/ TLM2	
42.	Example programs	1	11-05-2024		TLM1/ TLM2	
43.	Unions	2	13-05-2024 14-05-2024		TLM1/ TLM2	
44.	Example programs	1	16-05-2024		TLM1/ TLM2	
45.	Revision	1	17-05-2024		TLM1/ TLM2	
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
46.	Introduction to Functions	1	18-05-2024		TLM1/ TLM2	
47.	Function Declaration and Definition	1	20-05-2024		TLM1/ TLM2	
48.	Function call Return Types	1	21-05-2024		TLM1/ TLM2	

49.	Arguments	1	23-05-2024		**TLM1/ TLM2**	
50.	modifying parameters inside functions using pointers	2	24-05-2024 25-05-2024		**TLM1/ TLM2**	
51.	arrays as parameters	1	27-05-2024		**TLM1/ TLM2**	
52.	Scope and Lifetime of Variables	1	28-05-2024		**TLM1/ TLM2**	
53.	Introduction to Files	1	30-05-2024		**TLM1/ TLM2**	
54.	Basics of File Handling	1	31-05-2024		**TLM1/ TLM2**	
55.	Operations on Files	1	01-06-2024		**TLM1/ TLM2**	
No. of classes required to complete UNIT – V: 11				**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
56.	Application Development using C	1	01-06-2024		**TLM1/ TLM2**	

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

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethic**s: 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 engaging independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1	To apply the knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in Aerospace vehicle design.
PSO2	To prepare the students to work effectively in Aerospace and Allied Engineering organizations.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr.V.V.Krishna Reddy**	**Dr. Y. Vijay Bhaskar Reddy**	**Dr. K. Phaneendra**	**Dr. B. Srinivas Rao**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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An ISO 21001:2018, 500001:2018, 14001:2015 Certified Institution
DEPARTMENT OF AEROSPACE ENGINEERING
Estd.: 1998 Website: https://www.lbrce.ac.in/ase/index.php Email: hodaero@lbrce.ac.in Phone:08659-222933 Ext:624/623

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. B. UDAYA LAKSHMI
Course Name & Code : Engineering Mechanics & 20ME02
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem : B. Tech / II-Sem **A.Y.:** 2023-24

PREREQUISITE: Engineering Physics, Mathematics

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To get familiarized with different types of force systems.
- To draw accurate free body diagrams representing forces and moments acting on body to analyze 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 if translational and rotational motion of rigid bodies.

COURSE OUTCOMES (COs): On Completion of the course, student should be able to

CO1	Determine the resultant of coplanar concurrent and non-concurrent force systems. (**Apply-L3**).
CO2	Apply the Static equilibrium conditions to determine unknown planar force systems and determine the frictional forces for the bodies in contact. (**Apply-L3**).
CO3	Calculate the centroids, center of gravity and moment of inertia ofgeometrical 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:

T1 S. S. Bhavikatti, Engineering Mechanics, 4thedition, New Age International (P) Ltd, 2012.

T2 N. H. Dubey, Engineering Mechanics, McGraw Hill, 2013

REFERENCE BOOKS:

R1 Ferdinand. L. Singer, Engineering Mechanics, 3rd edition, Harper – Collins, 1994

R2 B.Bhattacharya, Engineering Mechanics, 1stedition, Oxford University Press, 2008

R3 A.K.Tayal, Engineering Mechanics, 14thedition, 2ndreprint, Umesh Publications, 2012

R4 R.K.Bansal, Engineering Mechanics, 3rd edition, Laxmi Publications, 2016

R5 R.K.Rajput, A Text book of Applied Mechanics, Laxmi Publications, 2011.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: SYSTEM OF FORCES AND EQUILIBRIUM OF SYSTEM OF FORCES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Engineering Mechanics	1	12-2-24		TLM2	
2.	Course Outcomes, CEOs, POs, PEOs	1	14-2-24		TLM2	
3.	Basic terminology in Mechanics, laws of Mechanics	1	15-2-24		TLM,2	
4.	Force, Characteristics of Forces, Force Systems	1	16-2-24		TLM 1,2	
5.	Resolution and Composition of forces, Parallelogram, Triangle and Polygon Law of Forces	1	17-2-24		TLM1,2	
6.	Resultant of Coplanar Concurrent Force System-Problems	1	19-2-24		TLM1,2	
7.	Moment of a Force, Couple – Varignon's Theorem	1	21-2-24		TLM2	
8.	**Tutorial-1**	1	22-2-24		TLM3	
9.	Resultant of Coplanar Non-Concurrent Force System-Problems	1	23-2-24		TLM1,2	
10.	**EQUILIBRIUM OF SYSTEM OF FORCES**: Equilibrium equations of concurrent and non concurrent force system, Free Body Diagrams, Lami's Theorem	1	24-2-24		TLM1,2	
11.	Equilibrium of a rigid body subjected to coplanar concurrent forces	1	26-2-24		TLM2	
12.	Equilibrium of a rigid body subjected to non-concurrent forces- Problems.	1	28-2-24		TLM2	
13.	**Tutorial-2**	1	29-2-24		TLM3	
14.	Problems related to Connected Bodies, Roller problems	1	1-3-24		TLM1,2	
15.	Roller problems, Assignment -1/ Quiz-1	1	2-3-24		TLM2,3	
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: FRICTION

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	**FRICTION:** Introduction to Friction, advantages, disadvantages	1	4-3-24		TLM1, 2	
17.	Types of Friction, limiting friction, Laws of Friction	1	6-3-24		TLM1,2	
18.	Co-efficient of Friction, Angle of Friction – Angle of Repose	1	7-3-24		TLM1,2	
19.	Blocks resting on horizontal plane	1	11-3-24		TLM1,2	
20.	Problems on Blocks resting on horizontal plane	1	13-3-24		TLM1	
21.	One Block resting on another block, Blocks resting on Inclined plane	1	14-3-24		TLM1,2	

22.	Problems--Blocks resting on Inclined plane	1	15-3-24		TLM2	
23.	Problems--Blocks resting on Inclined plane	1	16-3-24		TLM2	
24.	**Tutorial-3**	1	18-3-24		TLM3	
25.	Problems--Blocks resting on Inclined plane Assignment -II/ Quiz-I1	1	20-3-24		TLM2,3	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: CENTROID AND AREA MOMENT OF INERTIA; CENTRE OF GRAVITY AND MASS MOMENT OF INERTIA

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	**CENTROID:** Introduction**,** Concept, Applications, axis of symmetry	1	21-3-24		TLM2	
27.	Centroid of simple figures from basic principles	1	22-3-24		TLM1,2	
28.	Centroid of simple composite sections	1	23-3-24		TLM2	
29.	**AREA MOMENT OF INERTIA:** Moment of inertia, Theorems of Moment of Inertia	1	25-3-24		TLM2	
30.	Determination of Moment of Inertia of Rectangle, Circle, Hollow Circle	1	27-3-24		TLM2	
31.	Determination of Moment of Inertia of Semi Circle, Triangle from basic principles	1	28-3-24		TLM2	
32.	Problems on moment of inertia	1	30-3-24		TLM1	
33.	**Tutorial – 4** - Area Moment of Inertia-problems	1	8-4-24		TLM3	
34.	Problems on Area moment of inertia	1	10-4-24		TLM1	
35.	Unit-III Revision (Centroid & Area Moment of Inertia)	1	12-4-24		TLM1	
36.	**CENTRE OF GRAVITY**: Centre of gravity of solid cylinder	1	15-4-24		TLM2	
37.	Centre of gravity of right circular cone, hemi sphere	1	18-4-24		TLM1,2	
38.	Centre of gravity of composite bodies	1	19-4-24		TLM1,2	
39.	**MASS MOMENT OF INERTIA:** Introduction**,** Radius of gyration	1	20-4-24		TLM2	
40.	Determination of Mass Moment of Inertia of Uniform Rod, Rectangular Plate, Circular Plate-problems	1	22-4-24		TLM1,2	
41.	**Tutorial-5 &** Assignment -III/ Quiz-III	1	24-4-24		TLM3	
42.	Determination of Mass Moment of Inertia of Solid Sphere, Solid Cylinder--problems	1	25-4-24		TLM1	
43.	Unit-III Revision	1	26-4-24		TLM1	
No. of classes required to complete UNIT-III: 20				**No. of classes taken:**		

UNIT-IV: RECTILINEAR AND CURVILINEAR MOTION OF A PARTICLE

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Introduction to Kinematics, **g**eneral principles in dynamics, types of motion, rectilinear motion	1	27-4-24		TLM1,2	
45.	Motion with Uniform Velocity - Problems	1	29-4-24		TLM1,2	
46.	Motion with Uniform Acceleration derivations- problems	1	1-5-24		TLM1,2	
47.	**Tutorial-6**	1	2-5-24		TLM1,2	
48.	Motion with Uniform Acceleration-Problems	1	3-5-24		TLM3	
49.	Motion with varying acceleration - Problems	1	4-5-24		TLM2	
50.	D-Alembert's principle –	1	6-5-24		TLM2	
51.	Work Energy method and applications to particle Impulse momentum method	1	8-5-24		TLM1,2	
52.	**Tutorial-7 &** Assignment -III/ Quiz-III	1	9-5-24		TLM3	
53.	Uniformly accelerated rotation-problems	1	10-5-24		TLM1,2	
54.	Unit-IV Revision	1	13-5-24		TLM1	
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V: RIGID BODY MOTION

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
55.	Introduction to Kinematics and kinetics of rigid bodies in translation	1	15-5-24		TLM1,2	
56.	Kinetics of rigid bodies Rotating about Fixed Axis, Derivations	1	16-5-24		TLM1,2	
57.	**Tutorial-8**	1	17-5-24		TLM3	
58.	Work Energy method	1	18-5-24		TLM1,2	
59.	Impulse momentum method	1	20-5-24		TLM2	
60.	Simple Applications	1	22-5-24		TLM1,2	
61.	**Tutorial-9**	1	23-5-24		TLM1,3	
62.	Fixed rotation of bodies, Assignment -V/ Quiz-V	1	24-5-24		TLM3	
63.	Curvilinear and general plane motion (Beyond Syllabus)	1	25-5-24		TLM1,2	
64.	Unit-V Revision	1	27-5-24		TLM2,3	
65.	Unit-III, IV, V Revision	1	29-5-24		TLM2,3	
66.	Unit-III, IV, V Revision	1	30-5-24		TLM1	
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		

SYLLABUS BEYOND 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.	Calculation of Support reactions	1	31-5-23		TLM1,2	
2.	Force Analysis of Trusses	1	31-5-23		TLM1,2	
No. of classes required to complete : 02				**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 (R17 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

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 knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in the Aerospace vehicle design
PSO 2	To prepare the students to work effectively in Aerospace and Allied Engineering organizations

Title	**Course Instructor**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	B.Udaya Lakshmi	S. Indrasena Reddy	Dr. P. Lova Raju
Signature			

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF FRESHMANENGINEERING

COURSE HANDOUT

PART-A

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

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	13-02-2024		TLM1		
2.	Preparation of a Bakelite	3	20-02-2024		TLM4	CO1	
3.	Determination of amount of HCl using standard Na_2CO_3 solution	3	27-02-2024		TLM4	CO1	
4.	Determination of Strength of an acid in Pb-Acid battery	3	05-03-2024		TLM4	CO1	
5.	Estimation of Ferrous Iron by Dichrometry	3	12-03-2024		TLM4	CO1	
6.	Estimation of Ferrous Iron by Permanganometry	3	19-03-2024		TLM4	CO1	
7.	Determination of hardness of a groundwater sample.	3	26-03-2024		TLM4	CO1	
8.	Determination of calorific value of gases by Junker's gas calorimeter.	3	16-04-2024		TLM4	CO1	
9.	Determination of viscosity of lubricating oil by Redwood Viscometer-1 &2	3	23-04-2024		TLM4	CO2	
10.	Preparation of nanomaterials by precipitation method	3	30-05-2024		TLM4	CO5	
11.	Additional experiment/repeat	3	07-05-2024		TLM4	CO1	
12.	Additional experiment/repeat	3	14-05-2024		TLM4	CO1	
13.	Internal Exam	3	21-05-2024 & 28-05-2024		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 R20 Distribution and Weightage of Marks for Laboratory Courses is as follows.

(a) Continuous Internal Evaluation(CIE):

- ✓ The continuous internal evaluation for laboratory course is based on the following parameters:

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

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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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
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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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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE HANDOUT

Part - A

PROGRAM : B.Tech., II-Sem., ASE

ACADEMIC YEAR : 2023-24

COURSE NAME & CODE : ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

L-T-P STRUCTURE : 0-0-3

COURSE CREDITS : 1

COURSE INSTRUCTOR : **Mrs. K.S.L.Lavany,Dr.A.V.G.A.Marthanda**

COURSE COORDINATOR : Dr.A.V.G.A.Marthanda

Course Objectives:
To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

Course Outcomes:
After the completion of the course students 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	

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

Part - B
COURSE DELIVERY PLAN (LESSON PLAN)
SECTION-A SCHEDULE

Day: Saturday(1,2,3 Hours)

	I Week	II Week	III Week	IV Week	V Week	VI Week	VII Week	VIII Week	IX Week	X Week	XI Week	XII Week	XIII Week	XIV Week
Tentative date	17/2/24	24/2/24	2/03/24	16/03/24	23/03/24	30/03/24	13/04/24	20/04/24	27/04/24	04/05/24	11/05/24	18/05/24	25/05/24	01/06/24
Actual date														
	Demo	**Exp 1**	**Exp 2**	**Exp 3**	**Exp 4**	**Exp 5**	**Exp 6**	**Exp 7**	**Exp 8**	**Exp 9**	**Exp 10**	**Exp 11**	**Exp 12 Revision**	**INTERNAL EXAM**

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	12-02-2024	06-04-2024	8W
I Mid Examinations	01-04-2024	06-04-2024	1 W
II Phase of Instructions	08-04-2024	01-06-2024	8 W
II Mid Examinations	03-06-2024	08-06-2024	1 W
Preparation and Practicals	10-06-2024	15-06-2024	2W
Semester End Examinations	17-06-2024	29-06-2024	2W

Part – C

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO 2	Design and analyze electrical machines, modern drive and lighting systems
PSO 3	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO 4	Design controllers for electrical and electronic systems to improve their performance.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Mrs.K.S.L.Lavanya**	Dr.A.V.G.A.Marthanda	**Dr.G.Nageswar rao**	**Dr.J.Siva vara prasad**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF AEROSPACE ENGINEERING

PART-A

Name of Course Instructor : **Mr. V. V. Krishna Reddy**

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

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

Program/Sem/Sec : **B.Tech.–ASE /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–Level2**
CO2:	Select the right control structure for solving the problem. (Apply)	**Apply–Level3**
CO3:	Develop C programs which utilize memory efficiently using programming constructs like pointers. (Apply)	**Apply–Level3**
CO4:	Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C. (Apply).	**Apply–Level3**
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	PSO1	PSO2
CO1	3	2	-	-	3	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	3	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	3	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	3	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	2	2	2	2	2	-	-

TEXTBOOKS:

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

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

REFERENCE BOOKS:

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

R2: Programming in C, Reema Thareja, Oxford, 2016, 2nd edition

R3: C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Week 1: Familiarization with programming environment	3	14-02-2024		DM5	
2.	Week 2: Problem-solving using Algorithms and Flow charts.				DM5	
3.	Week 3: Exercise Programs on Variable types and type conversions	3	21-02-2024		DM5	
4.	Week 4: Exercise Programs on Operators and the precedence and associativity.	3	28-02-2024		DM5	
5.	Week 5: Exercise Programs on Branching and logical expressions	3	06-03-2024		DM5	
6.	Week 6: Exercise Programs on Loops, while and for loops	3	13-03-2024		DM5	
7.	Week 7: Exercise Programs on 1 D Arrays & searching.	3	20-03-2024		DM5	
8.	Week 8: Exercise Programs on2 D arrays, sorting and Strings.	3	27-03-2024		DM5	
9.	Week 9: Exercise Programs on Pointers, structures and dynamic memory allocation	3	10-04-2024		DM5	
10.	Week 10: Exercise Programs on Bit fields, Self-Referential Structures, Linked lists	3	24-04-2024		DM5	
11.	Week 11: Exercise Programs on Functions, call by value, scope and extent.	3	01-05-2024		DM5	
12.	Week 12: Exercise Programs on Recursion, the structure of recursive calls	3	08-05-2024		DM5	
13.	Week 13: Exercise Programs on Call by reference, dangling pointers	3	15-05-2024		DM5	
14.	Week 14: Exercise Programs on File handling.	3	22-05-2024		DM5	
15.	Lab Internal	3	29-05-2024			

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

EVALUATION PROCESS (R23 Regulations):

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

PART-D

PROGRAMME OUTCOMES (POs):

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
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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 engaging independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1	To apply the knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in Aerospace vehicle design.
PSO2	To prepare the students to work effectively in Aerospace and Allied Engineering organizations.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr.V.V.Krishna Reddy**	**Dr. Y. Vijay Bhaskar Reddy**	**Dr. K. Phaneendra**	**Dr. B. Srinivas Rao**
Signature				

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COURSE HANDOUT

PART-A

Name of Course Instructor(s): **B.UDAYA LAKSHMI, A.PRATYUSH**

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 Monday (from 09.50 AM – 12.30 PM)

Batch size:

S.No	Batches	Regd. Nos	Total No. of Students
01	Section A	23761A0301 – 325, 325 – 350	50

Division of Batches:

Batch No	Regd. No of students	Batch size
A1	23761A0301 – 305	05
A2	23761A0307 – 311	04
A3	23761A0312 – 316	05
A4	23761A0317 – 321	05
A5	23761A0322 – 326	05

Batch No	Regd. No of students	Batch size
A6	23761A0326 – 330	05
A7	23761A0331 – 335	05
A8	23761A0336 – 340	05
A9	23761A0341 – 345	05
A10	23761A0346 – 350	05

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	**12-2-2024**		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			TLM4	
03	Verification of Law of Triangle of Forces	3	**19-2-2024**		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	**26-2-2024**		TLM4	
05	Determination of coefficient of Static and Rolling Frictions	3	**4-03-2024**		TLM4	
06	Determination of Centre of Gravity of different shaped Plane Lamina	3	**11-3-2024**		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	**18-3-2024**		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	**8-04-2024**		TLM4	
09	Determine the acceleration due to gravity using a compound pendulum	3	**15-04-2024**		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	**22-05-2024**		TLM4	
11	Determine the Moment of Inertia of a Flywheel	3	**29-05-2024**		TLM4	
12	Verification of the Law of Moment using Rotation Disc Apparatus and Bell Crank Lever	3	**6-05-2024**		TLM4	
13	Verification of Work Energy and Impulse Momentum methods	3	**13-05-2024**		TLM4	
14	REPITION LAB	3	**20-5-2024**			
15	Internal Exam and Viva - Voce	3	**27-05-2024**		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	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
12-02-2024										
19-02-2024	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10
26-02-2024	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 1
04-03-2024	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 1	Ex 2
11-03-2024	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 1	Ex 2	Ex 3
18-03-2024	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 1	Ex 2	Ex 3	Ex 4
8-04-2024	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5
15-04-2024	Ex 7	Ex 8	Ex 9	Ex 10	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6
22-04-2024	Ex 8	Ex 9	Ex 10	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7
29-04-2024	Ex 9	Ex 10	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8
06-05-2024	Ex 10	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9
13-05-2024	Ex 11	Ex 11	Ex 11	Ex 11	Ex 11	Ex 11	Ex 11	Ex 11	Ex 11	Ex 11
20-05-2024	Ex 12	Ex 12	Ex 12	Ex 12	Ex 12	Ex 12	Ex 12	Ex 12	Ex 12	Ex 12
27-05-2024	Internal Exam and Viva - Voce									

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		**EM LAB**			**LUNCH BREAK**			
Tuesday								
Wednesday								
Thursday								
Friday								
Saturday								

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.
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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 knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in the Aerospace vehicle design
PSO 2	To prepare the students to work effectively in Aerospace and Allied Engineering organizations

Title	Course Instructor	Module Coordinator	Head of the Department
Name of the Faculty	B.Udaya Lakshmi	S. Indrasena Reddy	Dr. P. Lova Raju
Signature			