LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, (AUTONOMOUS)
Accredited by NAAC with 'A' Grade & NBA (Under Tier - I),
ISO 21001 : 2018, 50001 : 2018, 14001: 2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

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

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To enlighten the learners in the concept of differential equations and multi-variable 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	02-02-2026		TLM2			
2.	Course Outcomes, Program Outcomes	1	03-02-2026		TLM2			

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
3.	Introduction to UNIT I	1	04-02-2026		TLM1	CO1	T1,T2	
4.	Linear Differential equation	1	06-02-2026		TLM1	CO1	T1,T2	
5.	Bernoulli's DE	1	09-02-2026		TLM1	CO1	T1,T2	
6.	Exact DE	1	10-02-2026		TLM1	CO1	T1,T2	
7.	Exact DE	1	11-02-2026		TLM1	CO1	T1,T2	
8.	Non-exact DE Type I	1	12-02-2026		TLM1	CO1	T1,T2	
9.	Non-exact DE Type II	1	13-02-2026		TLM1	CO1	T1,T2	
10.	Non-exact DE Type III	1	16-02-2026		TLM1	CO1	T1,T2	
11.	Non-exact DE Type IV	1	17-02-2026		TLM1	CO1	T1,T2	
12.	Newton's Law of cooling	1	18-02-2026		TLM1	CO1	T1,T2	
13.	Newton's Law of cooling	1	02-02-2026		TLM1	CO1	T1,T2	
14.	Law of natural growth and decay	1	19-02-2026		TLM1	CO1	T1,T2	
15.	Law of natural growth and decay	1	20-02-2026		TLM1	CO1	T1,T2	
16.	Electrical circuits	1	23-02-2026		TLM1	CO1	T1,T2	
17.	TUTORIAL - I	1	24-02-2026		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-I		14			No. of classes taken:			

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
18.	Introduction to UNIT II	1	25-02-2026		TLM1	CO1	T1,T2	
19.	Solving a homogeneous DE	1	26-02-2026		TLM1	CO1	T1,T2	
20.	Solving a homogeneous DE	1	27-02-2026		TLM1	CO1	T1,T2	
21.	Finding Particular Integral, P.I for e^{ax+b}	1	02-03-2026		TLM1	CO1	T1,T2	
22.	P.I for Cos bx, or sin bx	1	04-03-2026		TLM1	CO1	T1,T2	
23.	P.I for polynomial function	1	05-03-2026		TLM1	CO1	T1,T2	

24.	P.I for $e^{ax+b}v(x)$	1	06-03-2026		TLM1	CO1	T1,T2	
25.	P.I for $x^k v(x)$	1	09-03-2026		TLM1	CO1	T1,T2	
26.	Method of Variation of parameters	1	10-03-2026		TLM1	CO1	T1,T2	
27.	Method of Variation of parameters	1	11-03-2026		TLM1	CO1	T1,T2	
28.	Simultaneous linear equations	1	12-03-2026		TLM1	CO1	T1,T2	
29.	Simultaneous linear equations	1	13-03-2026		TLM1	CO1	T1,T2	
30.	L-C-R circuits	1	16-03-2026		TLM1	CO1	T1,T2	
31.	Simple Harmonic motion	1	17-03-2026		TLM1	CO1	T1,T2	
32.	TUTORIAL - II	1	18-03-2026		TLM3	CO1	T1,T2	
33.	Revision	1	20-03-2026		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-II		15			No. of classes taken:			

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

UNIT-III: Partial Differential Equations

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
34.	Introduction to Unit III	1	30-03-2026		TLM1	CO2	T1,T2	
35.	Formation of PDE by elimination of arbitrary constants	1	31-03-2026		TLM1	CO2	T1,T2	
36.	Formation of PDE by elimination of arbitrary functions	1	01-04-2026		TLM1	CO2	T1,T2	
37.	Formation of PDE by elimination of arbitrary functions	1	02-04-2026		TLM1	CO2	T1,T2	
38.	Solving of PDE	1	06-04-2026		TLM1	CO2	T1,T2	
39.	Lagrange's Method	1	07-04-2026		TLM1	CO2	T1,T2	
40.	Lagrange's Method	1	08-04-2026		TLM1	CO2	T1,T2	
41.	Homogeneous Linear PDE with constant coefficients	1	09-04-2026		TLM1	CO2	T1,T2	
42.	TUTORIAL - III	1	10-04-2026		TLM3	CO2	T1,T2	
No. of classes required to complete UNIT-III		09			No. of classes taken:			

UNIT-IV: Vector Differentiation

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
43.	Introduction to UNIT IV	1	13-04-2026		TLM1	CO3	T1,T2	
44.	Vector Differentiation	1	15-04-2026		TLM1	CO3	T1,T2	

45.	Gradient	1	16-04-2026		TLM1	CO3	T1,T2	
46.	Directional Derivative	1	17-04-2026		TLM1	CO3	T1,T2	
47.	Directional Derivative	1	20-04-2026		TLM1	CO3	T1,T2	
48.	Divergence	1	21-04-2026		TLM1	CO3	T1,T2	
49.	Curl	1	22-04-2026		TLM1	CO3	T1,T2	
50.	Problems	1	23-04-2026		TLM1	CO3	T1,T2	
51.	Solenoidal fields, Irrotational fields, potential surfaces	1	24-04-2026		TLM1	CO3	T1,T2	
52.	Solenoidal fields, Irrotational fields, potential surfaces	1	27-04-2026		TLM1	CO3	T1,T2	
53.	Laplacian, second order operators	1	28-04-2026		TLM1	CO3	T1,T2	
54.	Vector Identities	1	29-04-2026		TLM1	CO3	T1,T2	
55.	Vector Identities	1	30-04-2026		TLM1	CO3	T1,T2	
56.	TUTORIAL IV	1	01-05-2026		TLM3	CO3	T1,T2	
No. of classes required to complete UNIT-IV		14			No. of classes taken:			

UNIT-V: Vector Integration

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
57.	Introduction to Unit-V	1	04-05-2026		TLM1	CO4	T1,T2	
58.	Line Integral	1	05-05-2026		TLM1	CO4	T1,T2	
59.	Circulation	1	06-05-2026		TLM1	CO4	T1,T2	
60.	Work done	1	07-05-2026		TLM1	CO4	T1,T2	
61.	Surface Integral	1	08-05-2026		TLM1	CO4	T1,T2	
62.	Surface Integral	1	11-05-2026		TLM1	CO4	T1,T2	
63.	Flux	1	13-05-2026		TLM1	CO4	T1,T2	
64.	Green's Theorem	1	14-05-2026		TLM1	CO4	T1,T2	
65.	Green's Theorem	1	15-05-2026		TLM1	CO4	T1,T2	
66.	Stoke's Thoerem	3	01-06-2026 02-06-2026 03-06-2026		TLM1	CO4	T1,T2	
67.	Divergence Theorem	3	04-06-2026 05-06-2026 08-06-2026		TLM1	CO4	T1,T2	
68.	TUTORIAL - V	1	09-06-2026		TLM3	CO4	T1,T2	
No. of classes required to complete UNIT-V		16			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	3	10-06-2026 11-06-2026 12-06-2026		TLM2	CO2	T1,T2	
No. of classes		3			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	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Dr. D. Vijay Kumar	**Dr. K. Jhansi Rani**	**Dr. A. RAMI REDDY**	**Dr. T. Satyanarayana**
Course Instructor	Course Coordinator	Module Coordinator	HOD

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DIVISION OF CHEMISTRY

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.V. Parvathi
Course Name & Code :Engg Chemistry& 23FE06
L-T-P Structure :3-0-0 **Credits:03**
Program/Sem/Sec : B.Tech./Sem-II/CE **A.Y. :**2025-26

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

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

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

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

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

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

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

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

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

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, 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)

UNIT-I: Water Technology

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to CO's, PO's of EC	1	03-02-2026		TLM1	
2.	Soft and hardwater, Estimation of hardness of water by EDTA Method	1	04-02-2026		TLM1	
3.	Estimation of dissolved Oxygen	1	06-02-2026		TLM1	
4.	Boiler troubles – Priming, foaming	2	07-02-2026 & 10-02-2026		TLM1	
5.	Scale and sludge, Caustic embrittlement	1	11-02-2026		TLM1	
6.	Industrial water treatment	1	13-02-2026		TLM1	
7.	Specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards	1	17-02-2026		TLM1	
8.	Ion-exchange processes - desalination of brackish water	1	18-02-2026 & 20-02-2026		TLM1	
9.	reverse osmosis (RO) and electrodialysis	1	21-02-2026		TLM1	
10.	Revision and assignment	2	24-02-2026 & 25-02-2026		TLM1	
No. of classes required to complete UNIT-I: 13				No. of classes taken:		

UNIT-II: ELECTROCHEMISTRY AND APPLICATIONS

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

UNIT-III: POLYMERS AND FUEL CHEMISTRY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to polymers, functionality of monomers	1	31-03-2026		TLM1	
2.	Mechanism of chain growth and step growth polymerization	1	01-04-2026		TLM1	

3.	Plastics –Thermo and Thermosetting plastics- Preparation, properties and applications of – Polystyrene, PVC, Teflon	1	03-04-2026		TLM1	
4.	Preparation, properties and applications of – Bakelite, Nylon-6,6,	1	04-04-2026		TLM1	
5.	Elastomers–Buna-S, Buna-N, Thiokol rubbers– preparation, properties and applications	1	07-04-2026		TLM1	
6.	Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value;	1	08-04-2026		TLM1	
7.	Analysis of coal (Proximate and Ultimate analysis)	2	10-04-2026		TLM1	
8.	Liquid Fuels, refining of petroleum, Octane and Cetane number	2	14-04-2026		TLM1	
9.	Alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.	2	15-04-2026		TLM1	
10.	Revision and assignment	1	17-04-2026		TLM1	
No. of classes required to complete UNIT-IV: 12				No. of classes taken:		

UNIT-IV: Modern Engineering Materials

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites	1	18-04-2026		TLM1	
2.	Properties and Engineering applications of composites	1	21-04-2026		TLM1	
3.	Refractories- Classification, Properties, Factors affecting the refractory materials and Applications	1	22-04-2026		TLM1	
4.	Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index	1	24-04-2026		TLM1	

5.	Flash point, Fire point, Cloud point, saponification and Applications	1	25-04-2026		TLM1	
6.	Building materials- Portland Cement, constituents.	1	28-04-20268		TLM1	
7.	Setting and Hardening of cement.	1	29-04-2026		TLM1	
8.	Revision and assignment	1	01-05-2026		TLM1	
No. of classes required to complete UNIT-IV: 08				No. of classes taken:		

UNIT-V: Surface Chemistry and Nanomaterial

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to surface chemistry, colloids.	1	02-05-2026		TLM1	
2.	Nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method)	2	05-05-2026		TLM1	
3.	Chemical and biological methods of preparation of nanometals and metal oxides	2	06-05-2026		TLM1	
4.	Stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir)	2	08-05-2026		TLM1	
5.	BET equation (no derivation) applications of colloids and nanomaterials ,	1	09-05-2026		TLM1	
9.	Catalysis, medicine, sensors	1	12-05-2026		TLM1	
10	Revision and assignment	1	13-05-2026			
No. of classes required to complete UNIT-V: 10				No. of classes taken:		

TOPICS BEYOND THE SYLLABUS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Applications of semiconductors, superconductors and nanomaterials in advanced technologies.	1	15-05-2026 & 16-05-2026		TLM1	

Revision Schedule

S.No.	Revision	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Unit-I	2	02-06-2026 & 03-06-2026		TLM1	
2.	Unit-II	2	05-06-2026 & 06-06-2026		TLM1	
3.	Unit-III	1	09-06-2026		TLM1	
4.	Unit-IV	1	10-06-2026		TLM1	
5.	Unit-V	1	12-06-2026		TLM1	
No. of classes required for revision: 7				No. of classes taken:		

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

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr.V.Parvathi	Dr.V.Parvathi	Dr.V.Parvathi	Dr.T.Satyanarayna
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. J. Venkateswara Rao

Course Name & Code : Engineering Mechanics & 23ME02
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem : B. Tech / II-Sem **A.Y.:** 2025-26
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	02-02-2026		TLM2	
2.	Course Outcomes, CEOs, POs, PEOs	1	03-02-2026		TLM2	
3.	Basic terminology in Mechanics, laws of Mechanics	1	05-02-2026		TLM,2	
4.	Force, Characteristics of Forces, Force Systems	1	07-02-2026		TLM 1,2	
5.	Resolution and Composition of forces, Parallelogram, Triangle and Polygon Law ofForces	1	09-02-2026		TLM1,2	
6.	Resultant of Coplanar Concurrent Force System-Problems	1	10-02-2026		TLM1,2	
7.	Moment of a Force, Couple – Varignon's Theorem	1	12-02-2026		TLM2	
8.	**Tutorial-1**	1	14-02-2026		TLM3	
9.	Resultant of Coplanar Non-Concurrent ForceSystem-Problems	1	16-02-2026		TLM1,2	
10.	**EQUILIBRIUM OF SYSTEM OF FORCES**: Equilibrium equations of concurrent and non-concurrent force system, Free Body Diagrams,Lami's Theorem	1	17-02-2026		TLM1,2	
11.	Equilibrium of a rigid body subjected to coplanar concurrent forces	1	19-02-2026		TLM2	
12.	Equilibrium of a rigid body subjected to non-concurrent forces- Problems.	1	21-02-2026		TLM2	
13.	**Tutorial-2**	1	23-02-2026		TLM3	
14.	Problems related to Connected Bodies, Rollerproblems	1	24-02-2026		TLM1,2	
15.	Roller problems, Assignment -1/ Quiz-1	1	26-02-2026		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	28-02-2026		TLM1, 2	
17.	Types of Friction, limiting friction, Laws of Friction	1	02-03-2026		TLM1,2	
18.	Co-efficient of Friction, Angle of Friction –Angle of Repose	1	05-03-2026		TLM1,2	
19.	Blocks resting on horizontal plane	1	07-03-2026		TLM1,2	
20.	Problems on Blocks resting on horizontal plane	1	09-03-2026		TLM1	
21.	One Block resting on another block, Blocksresting on Inclined plane	1	10-03-2026		TLM1,2	
22.	Problems--Blocks resting on Inclined	1	12-03-2026		TLM2	
23.	Problems--Blocks resting on Inclined plane	1	14-03-2026		TLM2	
24.	**Tutorial-3**	1	16-03-2026		TLM3	
25.	Problems--Blocks resting on Inclined planeAssignment -II/ Quiz-I1	1	17-03-2026		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	21-03-2026		TLM2	
27.	Centroid of simple figures from basic principles	1	30-03-2026		TLM1,2	
28.	Centroid of simple composite sections	1	31-03-2026		TLM2	
29.	**AREA MOMENT OF INERTIA:** Moment of inertia, Theorems of Moment of Inertia	1	02-04-2026		TLM2	
30.	Determination of Moment of Inertia of Rectangle, Circle, Hollow Circle	1	04-04-2026		TLM2	
31.	Determination of Moment of Inertia of SemiCircle, Triangle from basic principles	1	06-04-2026		TLM2	
32.	Problems on moment of inertia	1	07-04-2026		TLM1	
33.	**Tutorial – 4** - Area Moment of Inertia-problems	1	09-04-2026		TLM3	
34.	Problems on Area moment of inertia	1	11-04-2026		TLM1	
35.	Unit-III Revision (Centroid & Area Moment of Inertia)	1	13-04-2026		TLM1	
36.	**CENTRE OF GRAVITY**: Centre of gravity ofsolid cylinder	1	16-04-2026		TLM2	
37.	Centre of gravity of right circular cone, hemisphere	1	18-04-2026		TLM1,2	
38.	Centre of gravity of composite bodies	1	20-04-2026		TLM1,2	
39.	**MASS MOMENT OF INERTIA:** Introduction**,**Radius of gyration	1	21-04-2026		TLM2	
40.	Determination of Mass Moment of Inertia of Uniform Rod, Rectangular Plate, Circular Plate-problems	1	23-04-2026		TLM1,2	
41.	**Tutorial-5 &** Assignment -III/ Quiz-III	1	25-04-2026		TLM3	
42.	Determination of Mass Moment of Inertia ofSolid Sphere, Solid Cylinder--problems	1	27-04-2026		TLM1	
43.	Unit-III Revision	1	28-04-2026		TLM1	
No. of classes required to complete UNIT-III:18				**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	30-04-2026		TLM1,2	
45.	Motion with Uniform Velocity - Problems	1	02-05-2026		TLM1,2	
46.	Motion with Uniform Acceleration-problems	1	04-05-2026		TLM1,2	
47.	**Tutorial-6**	1	05-05-2026		TLM1,2	
48.	Motion with Uniform Acceleration-Problems	1	07-05-2026		TLM3	

49.	Motion with varying acceleration - Problems	1	09-05-2026		TLM2	
50.	D-Alembert's principle –	1	11-05-2026		TLM2	
51.	Work Energy method and applications to particle motion, Impulse momentum method	1	12-05-2026		TLM1,2	
52.	**Tutorial-7 &** Assignment -IV/ Quiz-IV	1	14-05-2026		TLM3	
53.	Uniformly accelerated rotation-problems	1	16-05-2026		TLM1,2	
No. of classes required to complete UNIT-IV: 10				**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
54.	Introduction to Kinematics and kinetics of Rigid Bodies in translation	1	01-06-2026		TLM1,2	
55.	Kinetics of rigid bodies Rotating about Fixed Axis	1	02-06-2026		TLM1,2	
56.	**Tutorial-8**	1	04-06-2026		TLM3	
57.	Work Energy method	1	06-06-2026		TLM1,2	
58.	Impulse momentum method, Simple Applications	1	08-06-2026		TLM2	
59.	**Tutorial-9** & Assignment -V / Quiz-V	1	09-06-2026		TLM1,2	
60.	Fixed rotation of bodies	1	11-06-2026		TLM1,3	
61.	Review of Unit-5	1	13-06-2026		TLM3	
No. of classes required to complete UNIT-V: 8				**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	**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	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Dr.J.V.Rao	Dr.M.B.S.S. Reddy	Dr.C.Rajamallu	Dr.K.V.Ramana
Signature				

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor	: **Dr. B. SRINIVASA RAO**	
Course Name & Code	: **INTRODUCTION TO PROGRAMMING &**	**23CS01**
L-T-P Structure	: **3-0-0**	Credits: **3**
Program/Sem/Sec	: **B.TECH.(CE)/II SEMESTER/A SECTION**	A.Y. : **2025-26**

PRE-REQUISITE : 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, concept of algorithms and flowcharts.	**Understand – L2**
CO2:	Understand the features of C language.	**Understand – L2**
CO3:	Interpret the problem and develop an algorithm to solve it.	**Apply – L3**
CO4:	Implement various algorithms using the C programming language.	**Apply – L3**
CO5:	Develop skills required for problem-solving and optimizing the code.	**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	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low						**2 –** Medium						**3 –** High			

TEXTBOOKS:

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

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

REFERENCE BOOKS:

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

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I: Introduction to Programming and Problem Solving

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Discussion of CEO's and CO's	1	02-02-2026		TLM2	
2.	Introduction to Programming	1	03-02-2026		TLM2	
3.	COs & CO-PO Mapping History of Computers	2	05-02-2026 07-02-2026		TLM2 TLM2	
4.	Basic organization of a computer: ALU, input-output units, Memory, program counter	1	09-02-2026		TLM2	
5.	Introduction to Programming Languages,	1	10-02-2026		TLM2	
6.	Basics of a Computer Program- Algorithms	1	12-02-2026		TLM2	
7.	Flowcharts (Using Dia-Tool), pseudo code.	1	14-02-2026		TLM2	
8.	Introduction to Compilation and Execution	1	16-02-2026		TLM2	
9.	Primitive Data Types	1	17-02-2026		TLM2	
10.	Variables, and Constants, Basic Input and Output operations	1	19-02-2026		TLM2	
11.	Type Conversion, and Casting	1	21-02-2026		TLM2	
12.	**Problem solving techniques:** Algorithmic approach, characteristics of algorithm	1	23-02-2026		TLM2	
13.	Problem solving strategies: Top-down approach, Bottom-up approach	1	24-02-2026		TLM2	
14.	Time and space complexities of algorithms.	1	26-02-2026		TLM2	
No. of classes required to complete UNIT – I: 15				**No. of classes taken:**		

UNIT – II: Control Structures

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Simple sequential programs Conditional Statements	1	28-02-2026		TLM2	
16.	if, if-else	1	02-03-2026		TLM2	
17.	Else-if ladder, nested if	1	05-03-2026		TLM2	
18.	Switch, sample programs	1	07-03-2026		TLM2	
19.	Example programs on Decision Making and Branching	1	09-03-2026		TLM2	
20.	Loops: while , Example programs	1	10-03-2026		TLM2	
21.	Loops: do-while, Example programs	1	12-03-2026		TLM2	
22.	Loops: for, Example programs	1	14-03-2026		TLM2	
23.	Break , Example programs	1	16-03-2026		TLM2	
24.	Continue, Goto Example programs	1	17-03-2026		TLM2	
No. of classes required to complete UNIT – II: 10				**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	30-03-2026		TLM2	
26.	Array indexing, Accessing elements	1	31-03-2026		TLM2	
27.	Memory model	1	02-04-2026		TLM2	
28.	Programs with array of integers	1	04--04-2026		TLM2	
29.	Introduction to two dimensional arrays	1	06-04-2026		TLM2	
30.	2D Array indexing, Accessing elements	1	07-04-2026		TLM2	
31.	Programs with 2D arrays	1	09-04-2026		TLM2	
32.	Introduction to Strings	1	11-04-2026		TLM2	
33.	Strings: Reading & Writing Operations	1	13-04-2026		TLM2	
34.	String Handling Functions	2	16-04-2026 18-04-2026		TLM2	
No. of classes required to complete UNIT – III: 11				**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
35.	Introduction to Pointers	1	20-04-2026		TLM2	
36.	Dereferencing and address operators	1	21-04-2026		TLM2	
37.	Pointer and address arithmetic	1	23-04-2026		TLM2	
38. 39.	Array manipulation using pointers	2	25-04-2026 27-04-2026		TLM2	
40.	User-defined data types	1	28-04-2026		TLM2	
41. 42.	Structures, Definition and Initialization	2	30-04-2026 02-05-2026		TLM2 TLM2	
43.	Example programs	1	04-05-2026		TLM2	
44.	Unions	1	05-05-2026		TLM2	
45.	Example programs	1	07-05-2026		TLM2	
46.	Revision	1	09-05-2026		TLM2	
No. of classes required to complete UNIT – IV: 11				**No. of classes taken:**		

UNIT – V: Functions and File Handling

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
47.	Introduction to Functions	1	11-05-2026		TLM2	
48.	Function Declaration and Definition	1	12-05-2026		TLM2	
49.	Function call Return Types	1	14-05-2026		TLM2	
50.	Arguments	1	16-05-2026		TLM2	
51. 52.	Modifying parameters inside functions using pointers	1	01-06-2026		TLM2	
53.	Arrays as parameters	1	02-06-2026		TLM2	
54.	Scope and Lifetime of Variables	1	04-06-2026		TLM2	
55.	Storage classes examples	1	06-06-2026		TLM2	
56.	Introduction to Files	1	08-06-2026		TLM2	
57.	Basics of File Handling	1	09-06-2026		TLM2	
58.	Operations on Files	1	11-06-2026		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
59.	Real time problems on Control structures, Arrays, Patterns & Strings	1	13-06-2026		TLM2	

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

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs) - AEROSPACE ENGINEERING:

PSO1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering.
PSO2	Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands.
PSO3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr. B. SRINIVASA RAO**	**Dr. B. SRINIVASA RAO**	**Dr. K. PHANEENDRA**	**Dr. D. RATNA KISHORE**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

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

DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. P. Venkat Rao

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

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

Program/Sem./Sec. : B.Tech/I/CIVIL **A.Y.:** 2025-26

Regulations: R23

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): CIVIL

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	03-02-2026		TLM1	
2.	Evolution of electronics, Vacuum tubes to nano electronics	1	04-02-2026		TLM1	
3.	Characteristics of PN Junction Diode	1	06-02-2026		TLM1	
4.	Zener Diode and its Characteristics- **Role-Play Pedagogy–Charge Carrier Flow in Zener Diode (ITM)**	1	07-02-2026		TLM3	
5.	Bipolar Junction Transistor	1	10-02-2026		TLM6	
6.	Bipolar Junction Transistor	1	11-02-2026		TLM1	
7.	CB Configurations and Characteristics	1	13-02-2026		TLM1	
8.	CE,CC Configurations and Characteristics.	1	14-02-2026		TLM2	
9.	Elementary Treatment of Small Signal CE Amplifier.	1	17-02-2026		TLM2	
No. of classes required to complete UNIT-I: 09				**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
10.	Rectifiers and power supplies: Block diagram description of a DC power supply	1	18-02-2026		TLM1	
11.	Working of full wave bridge rectifier	1	20-02-2026		TLM1	
12.	Working of full wave bridge rectifier, capacitor filter (no analysis)	1	21-02-2026		TLM1	
13.	simple Zener voltage regulator.	1	24-02-2026		TLM1	
14.	Amplifiers: Block diagram of Public Address system	1	25-02-2026		TLM2	
15.	Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. **QUIZ- ITM**	1	27-02-2026		TLM3	
16.	Electronic Instrumentation**:** Block diagram of an electronic instrumentation system.	1	28-02-2026		TLM2	
17.	Operation of electronic instrumentation system.	1	03-03-2026		TLM1	
No. of classes required to complete UNIT-II: 08				**No. of classes taken:**		

UNIT-III: Digital Electronics

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18.	Overview of Number Systems	1	04-03-2026		TLM1	
19.	Logic gates including Universal Gates,	1	06-03-2026		TLM2	

20.	BCD codes, Excess-3 code, **Logic Gates as decision devices- Activity based Learning**	1	07-03-2026		TLM6	
21.	gray code, Hamming code,	1	10-03-2026		TLM2	
22.	Boolean Algebra, Basic Theorems and properties of Boolean Algebra	1	11-03-2026		TLM1	
23.	Simple combinational circuits	1	13-03-2026		TLM1	
24.	Half and Full Adders,	1	14-03-2026		TLM3	
25.	Introduction to sequential circuits, Flip flops	1	17-03-2026		TLM1	
26.	Registers and counters	1	18-03-2026		TLM2	
27.	Revision	1	20-03-2026		TLM1	
No. of classes required to complete UNIT-III: 10				**No. of classes taken:**		

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
28.	DC Circuits: Electrical circuit elements (R, L and C)	1	31-03-2026		TLM1	
29.	Ohm's Law and its limitations	1	01-04-2026		TLM2	
30.	KCL & KVL- **Activity-Based Learning – KCL & KVL Visualization (ITM)**	1	04-04-2026		TLM1	
31.	series, parallel, series-parallel circuits	1	07-04-2026		TLM2	
32.	Super Position theorem	1	08-04-2026		TLM1	
33.	Simple Numerical problems	1	10-04-2026		TLM3	
34.	AC Circuits: A.C. Fundamentals:	1	11-04-2026		TLM1	
35.	Equation of AC Voltage and current, waveform	1	15-04-2026		TLM2	
36.	Time period, frequency, amplitude, phase, phase difference, average value, RMS value	1	17-04-2026		TLM1	
37.	Form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits	1	18-04-2026		TLM2	
38.	Concept of Impedance, Active power, reactive power and apparent power	1	21-04-2026		TLM1	
39.	Concept of power factor (Simple Numerical problems).	1	22-04-2026		TLM3	
No. of classes required to complete UNIT-III: 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
40.	Machines: Construction, principle and operation of DC Motor	1	24-04-2026		TLM1	
41.	Construction, principle and operation of DC Generator	1	25-04-2026		TLM2	
42.	Construction, principle and operation of single Phase transformer	1	28-04-2026		TLM2	
43.	Construction, principle and	1	29-04-2026		TLM1	

	operation of Three Phase Induction Motor					
44.	Construction, principle and operation of Alternator	1	01-05-2026		TLM2	
45.	Applications of electrical machines	1	02-05-2026		TLM1	
46.	Measuring Instruments: working principle of Permanent Magnet Moving Coil (PMMC)	1	04-05-2026		TLM1	
47.	Construction and working of Permanent Magnet Moving Coil (PMMC)- - **SEMINAR**	1	05-05-2025		TLM6	
48.	Moving Iron (MI) Instruments	1	08-05-2026		TLM2	
49.	Wheat Stone bridge.	1	09-05-2026		TLM3	
No. of classes required to complete UNIT-III: 10				**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
50.	Energy Resources: : Conventional and non-conventional energy resources	1	12-05-2026		TLM1	
51.	Layout and operation of various Power Generation systems: Hydel power generation	1	13-05-2026		TLM2	
52.	Layout and operation of Nuclear power generation	1	15-05-2026		TLM1	
53.	Layout and operation of Solar power generation	1	16-05-2026		TLM2	
54.	Layout and operation of Wind power generation.	1	02-06-2026		TLM1	
55.	Electricity bill: : Power rating of household appliances including air conditioners PCs, Laptops, Printers, etc	1	03-06-2026		TLM1	
56.	Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers- **Electricity Bill as a story problem-ITM**	2	05-06-2026 06-06-2026		TLM3	
57.	Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker(MCB), merits and demerits	1	09-06-2026		TLM1	
58.	Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.	1	10-06-2026		TLM2	
59.	Revision	1	12-06-2026		TLM1	
No. of classes required to complete UNIT-III: 11				**No. of classes taken:**		

Content Beyond the Syllabus:

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
60.	Case study on usage of Electrical and Electronics circuits in CIVIL Engineering	1	13-06-2026		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 (R23 Regulation):

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions	02-02-2026	21-03-2026	7W
I Mid Examinations	**23-03-2026**	**28-03-2026**	**1W**
II Phase of Instructions	30-03-2026	16-05-2026	7W
Summer vocation	18-05-2026	30-05-2026	2W
II Phase of Instructions	01-06-2026	13-06-2026	2W
II Mid Examinations	**15-06-2026**	**20-06-2026**	**1W**
Preparation and Practical's	22-06-2026	27-06-2026	1W
Semester End Examinations	29-06-2026	11-07-2026	2W

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Date: 02-02-2026

Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Dr. P. Venkat Rao	Dr. A.V.G.A. Marthanda	Dr. G. Nageswara Rao	Dr. G. Srinivasulu

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Phone: 08659-222933, Fax: 08659-222931

DIVISION OF CHEMISTRY

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

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

Pre requisites: Nil

Course Educational Objective:

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

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

CO1: Analyze important parameters of water to check its suitability for drinking purpose and industrial applications. (**Analyze)**

CO2: Acquire practical knowledge related to preparation of Bakelite and nanomaterials. **(Apply)**

CO3: Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus. **(Understand)**

CO4: To estimate the amount of calcium in cement and the strength of acid present in Pb-Acid battery. (**Apply**)

CO5: Improve individual / teamwork skills, communication and report writing skills with ethical values. (**Apply**)

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

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

Bos Approved Lab Manual

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

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 Engineering chemistry lab	3	02-02-2026		TLM1		
2	Safety measures in chemistry lab	3	09-02-2026		TLM1		
3	Basic terminology of volumetric analysis.	3	16-02-2026		TLM1		
4	Demonstration of volumetric titration and practice session	3	23-02-2026		TLM4	CO1	
5	Preparation of a Bakelite	3	02-03-2026		TLM4	CO2	
6	Determination of amount of HCl using standard Na_2CO_3 solution	3	09-03-2026		TLM4	CO3	
7	Determination of Strength of an acid in Pb-Acid battery	3	16-03-2026		TLM4	CO4	
8	Estimation of Ferrous Iron by Dichrometry	3	23-03-2026		TLM4	CO3	
9	Estimation of Ferrous Iron by Permanganometry	3	30-03-2026		TLM4	CO3	
10	Determination of hardness of a groundwater sample.	3	06-04-2026		TLM4	CO1	
11	Determination of calorific value of gases by Junker's gas calorimeter.	3	13-04-2026		TLM4	CO2	
12	Determination of viscosity of lubricating oil by Redwood Viscometer-1 &2	3	20-04-2026		TLM4	CO3	
13	Preparation of nanomaterials by precipitation method	3	27-04-2026		TLM4	CO3	
14	Revision and conduct of experiments for absentees of regular lab session.	3	04-05-2026		TLM4	CO1	
15	Revision and conduct of experiments for absentees of regular lab session.	3	11-05-2026		TLM4		
16	Virtual lab- I	3	18-05-2026		TLM4	CO3	
17	Virtual lab- II	3	25-05-2026		TLM4	CO3	

18	Additional experiment	3	01-06--2026		TLM4	CO3	
19	Internal examination	3	08-06-2026				
	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	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr.V.Paravthi**	**Dr.V.Paravthi**	**Dr.V.Paravthi**	**Dr.T.Satyanarayana**
Signature				

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

DEPARTMENT OF ECE

LAB HANDOUT

PART-A

Date: 02-02-2026

Name of Course Instructor : Dr. P. Venkat Rao, Mrs.B.Rajewari, Mr.M. Sambasiva Reddy, Ms. B. Lakshmi Thirupathamma

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

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

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

PREREQUISITE: NIL

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

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

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

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

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
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	05-02-2026		TLM4	
2.	Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.	3	12-02-2026		TLM4	
3.	Plot V – I characteristics of Zener Diode and its application as voltage Regulator.	3	19-02-2026		TLM4	
4.	Implementation of half wave and full wave rectifiers	3	26-02-2026		TLM4	
5.	Plot Input & Output characteristics of BJT in CB configuration-04	3	05-03-2026		TLM4	
6.	Frequency response of CE amplifier.	3	12-03-2026		TLM4	
7.	Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs	3	19-03-2026		TLM4	
8.	Internal Lab Examination (**Electronics**)	3	02-04-2026		TLM4	
9.	Verification of KCL and KVL	3	09-04-2026		TLM4	
10.	Verification of Superposition Theorem	3	16-04-2026		TLM4	
11.	Measurement of Resistance using Wheat stone bridge	3	23-04-2026		TLM4	
12.	Magnetization Characteristics of DC Shunt Generator	3	30-04-2026		TLM4	
13.	Measurement of Power and Power factor using Single-phase wattmeter	3	07-05-2026		TLM4	
14.	Calculation of Electrical Energy for Domestic Premises	3	14-05-2026		TLM4	
15.	Revision- Virtual lab experiments	3	04-06-2026		TLM4	
16.	Internal Lab Examination (**Electricals**)		12-06-2026		TLM4	
No. of classes required: 48				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	**Expt. no's**	**Marks**
Day to Day work	1,2,3,4,5,6,7,8…	A1 =10
Record and observation	1,2,3,4,5,6,7,8…	B1 = 5
Internal Exam	1,2,3,4,5,6,7,8…	**C1=15**
Cumulative Internal Examination (CIE):(A1+B1+C1)	1,2,3,4,5,6,7,8…	**30**
Semester End Examination (SEE)	1,2,3,4,5,6,7,8…	**70**

Total Marks=CIE+SEE		**100**

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**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: 02-02-2026

Course Instructors	Course Coordinator	Module Coordinator	Head of the Department
Dr. P. Venkat Rao Mrs.B.Rajewari Mr.M. Sambasiva Reddy, Ms. B. Lakshmi Thirupathamn	Dr. AVGA Marthanda	Dr. G.Nageswara Rao	Dr. G.Srinivasulu

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http://lbrce.ac.in/civil/index.php,Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

PART-A

Name of Course Instructor : **Mr.B.Ravindra chanti babu**

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

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

Program/Sem/Sec : **B.Tech.–Civil /II Sem** **A.Y. : 2025-26**

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.	**Apply–Level3**

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	3	-	-	-	-	-	-	-	-	-
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	06-02-2026		DM5	
2.	Week 2: Problem-solving using Algorithms and Flow charts.	3	13-02-2026		DM5	
3.	Week 3: Exercise Programs on Variable types and type conversions	3	20-02-2026		DM5	
4.	Week 4: Exercise Programs on Operators and the precedence and as associativity.	3	27-02-2026		DM5	
5.	Week 5: Exercise Programs on Branching and logical expressions	3	06-03-2026		DM5	
6.	Week 6: Exercise Programs on Loops, while and for loops	3	13-03-2026		DM5	
7.	Week 7: Exercise Programs on 1 D Arrays & searching.	3	20-03-2026		DM5	
8.	Week 8: Exercise Programs on2 D arrays, sorting and Strings.	3	10-04-2026		DM5	
9.	Week 9: Exercise Programs on Pointers, structures and dynamic memory allocation	3	17-05-2026		DM5	
10.	Week 10: Exercise Programs on Bit fields, Self-Referential Structures, Linked lists	3	24-04-2026		DM5	
11.	Week 11: Exercise Programs on Functions, call by value, scope and extent.	3	01-05-2026		DM5	
12.	Week 12: Exercise Programs on Recursion, the structure of recursive calls	3	08-05-2026		DM5	
13.	Week 13: Exercise Programs on Call by reference, dangling pointers	3	15-05-2026		DM5	
14.	Week 14: Exercise Programs on File handling.	3	05-06-2026		DM5	
15.	Lab Internal	3	12-06-2026		DM5	

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

PART-C

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

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.
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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	**Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering.**
PSO2	**Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands.**
PSO3	**Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain.**

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr.B.Ravindra chanti babu**	**Dr.B.Srinivasa Rao**	**Dr.K.Phaneendra**	**Dr.D.Ratna Kishore**
Signature				

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: P. Mohanaganga Raju, Dr. J. Venkateswara Rao

Course Name & Code	**:** Engineering Mechanics & Building Practices Lab & 23CE51	**Regulation:** R23	
L-T-P Structure	**:** 0-0-3	**Credits**	**:** 1.5
Program/Sem/Sec	: B. Tech / II-Sem/CE	**A.Y.**	**:** 2025-26

Pre-requisites: Engineering Mechanics, Engineering Physics

Course objectives: By the end of this course student will be able to

1. Understand the layout of a building, concepts of Non-Destructive Testing and different Alternative Materials.
2. Verify the Law of Parallelogram of Forces and Lami's theorem.
3. Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.

Course Out comes: At the end of the course, the student will be able to:

CO1	Illustrate the purpose and working of various tools and materials used in Civil Engineering practice (**Understand**).
CO2	Demonstrate the plumbing and safety practices adopted in construction industry and documentation aspects of quality testing of civil engineering materials (**Understand**).
CO3	Verify the fundamentals involved in the applications of engineering mechanics (**Apply**)

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

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

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DEPARTMENT OF CIVIL ENGINEERING

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

List of Experiments

Cycle-I

I. To study various types of tools used in construction.
II. Study of Alternative Materials like M-sand, Fly ash, Sea Sand etc.
III. Safety Practices in Construction industry.
IV. Demonstration of Non-Destructive Testing - using Rebound Hammer & UPV.
V. Study of plumbing in buildings

Cycle-II

I. Experimental Proof of Lami's Theorem
II. Verification of Law of Parallelogram of Forces.
III. Determination of Centre of Gravity of different shaped Plane Lamina.
IV. Determination of coefficient of Static and Rolling Friction.
V. Verification of Law of Moment.

Batches

BATCH: A	BATCH: B
A_1--------25761A0101 to 25761A0105	B_1 ------25761A0129 to 25761A0133
A_2--------25761A0106 to 25761A0110	B_2 ----- 25761A0134 to 25761A0139
A_3------- 25761A0111 to 25761A0115	B_3 ------- 25761A0140 to 25761A0144
A_4---------25761A0116 to 25761A0121	B_4 ------- 25761A0145 to 25761A0150
A_5---------25761A0122 to 25761A0128	B_5 ------- 25761A0151 to 25761A0156

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I CYCLE SCHEDULE: BATCH-A

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
04-02-2026		Demo	Demo	Demo	Demo	Demo
11-02-2026		A_1	A_2	A_3	A_4	A_5
18-02-2026		A_5	A_1	A_2	A_3	A_4
25-02-2026		A_4	A_5	A_1	A_2	A_3
11-03-2026		A_3	A_4	A_5	A_1	A_2
18-03-2026		A_2	A_3	A_4	A_5	A_1

II CYCLE SCHEDULE: BATCH-B

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
04-02-2026		Demo	Demo	Demo	Demo	Demo
11-02-2026		B_1	B_2	B_3	B_4	B_5
18-02-2026		B_5	B_1	B_2	B_3	B_4
25-02-2026		B_4	B_5	B_1	B_2	B_3
11-03-2026		B_3	B_4	B_5	B_1	B_2
18-03-2026		B_2	B_3	B_4	B_5	B_1

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II CYCLE SCHEDULE: BATCH-A

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
01-04-2026		A_1	A_2	A_3	A_4	A_5
08-04-2026		A_5	A_1	A_2	A_3	A_4
15-04-2026		A_4	A_5	A_1	A_2	A_3
22-04-2026		A_3	A_4	A_5	A_1	A_2
29-04-2026		A_2	A_3	A_4	A_5	A_1
06-05-2026		***REPITATION LAB***				
13-05-2026		***REPITATION LAB***				
03-06-2026		***REPITATION LAB***				
10-06-2026		***LAB INTERNAL***				

II CYCLE SCHEDULE: BATCH-B

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
01-04-2026		B_1	B_2	B_3	B_4	B_5
08-04-2026		B_5	B_1	B_2	B_3	B_4
15-04-2026		B_4	B_5	B_1	B_2	B_3
22-04-2026		B_3	B_4	B_5	B_1	B_2
29-04-2026		B_2	B_3	B_4	B_5	B_1
06-05-2026		***REPITATION LAB***				
13-05-2026		***REPITATION LAB***				
03-06-2026		***REPITATION LAB***				
10-06-2026		***LAB INTERNAL***				

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LAB TIMETABLE

Day	FN	AN
Monday		
Tuesday		
Wednesday	**EM & BP LAB**	
Thursday		
Friday		
Saturday		

Batch – A: 25761A0101 to 24761A0128

Batch – B: 25761A0129 to 25761A0156

ACADEMIC CALENDAR

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

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DEPARTMENT OF CIVIL ENGINEERING

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 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 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.
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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.
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PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader indiverse 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.
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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	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Course Instructor	**Module Coordinator**	**HOD**
Mr. P. Mohanaganga Raju Dr. J. Venkateswara Rao	Dr. Ch. Rajamallu	Dr. K. Venkata Ramana