LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)
Accredited by NAAC with "A" Grade &NBAfor ASE, CE, CSE, ECE, EEE & IT (Under Tier - I)
An ISO 21001:2018, 14001:2015, 50001:2018 Certified Institution
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
L.B. Reddy Nagar, Mylavaram, NTR Dist., Andhra Pradesh-521 230.
Phone: 08659-222933, **Fax**: 08659-222931
FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT
Part-A

PROGRAM	**:** I B. Tech., I-Sem., ASE
ACADEMIC YEAR	**:** 2026-27
COURSE NAME & CODE	**:** Linear Algebra & Calculus
L-T-P STRUCTURE	**:** 4-1-0
COURSE CREDITS	**:** 3
COURSE INSTRUCTOR	**: Ms** K.Naga Lakshmi
COURSE COORDINATOR	**:**.Dr. K. R. Kavitha
PRE-REQUISITES	**:** Basics of Matrices**,** Differentiation, Integration

Course Objectives:

- The main objective of this course is to provide the learner with variety of linear algebra techniques to solve linear systems, orthogonal representation of the quadratic surfaces and apply its knowledge in optimization problems.
- It aims further to calculate areas, surfaces and volumes in various coordinate systems.

Course Outcomes: Upon completion of the course, the student will be able to:

CO1	**:**	Analyse the solutions of homogeneous and non-homogeneous systems of linear equations. (K4)
CO2	**:**	Examine the eigenvalues and eigenvectors of a matrix to reduce a quadratic form to canonical form. (K4)
CO3	**:**	Estimate the bounds of a given function by mean vale theorems. (K3)
CO4	**:**	Apply the knowledge of derivatives in optimizing functions of several variables. (K3)
CO5	**:**	Compare different methods of evaluating double and triple integrals for finding areas and volumes. (K4)

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE ARTICULATION MATRIX (Correlation between Cos &POs):

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	H	M	-	-	-	-	-	-	-	-
CO2	H	H	M	-	-	-	-	-	-	-	-
CO3	H	H	M	-	-	-	-	-	-	-	-
CO4	H	H	M	-	-	-	-	-	-	-	-
CO5	H	H	M	-	-	-	-	-	-	-	-

H – High, M - Medium, L - Low

BOS APPROVED TEXT BOOKS:

T1 B. S. Grewal, "Higher Engineering Mathematics", 45th Edition, Khanna Publishers, 2024.

T2 Erwin Kreyszig, *"Advanced Engineering Mathematics"*, 11th Edition, John Wiley & sons, New Delhi, 2025.

BOS APPROVED REFERENCE BOOKS:

R1 B. V. Ramana, "Higher Engineering Mathematics", McGraw Hill Education, 2017.

R2 Glyn James, "Advanced Modern Engineering Mathematics", 5th Edition, Pearson Education, 2018.

R3 H. K. Dass, "Advanced Engineering Mathematics", 22nd Edition, S. Chand Publishing, 2022.

R4 R. K. Jain and S. R. K. Iyengar, "Advanced Engineering Mathematics", 5th Edition, Narosa Publications, New Delhi, 2016.

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.	Bridge Course	8	17-08-2026 TO 30-08-2026	17-08-2025 TO 30-08-2025	TLM1			
2.	Introduction to the course	1	31-08-2026		TLM1			
3.	Course Outcomes, Program Outcomes	1	01-09-2026		TLM2			

UNIT-I: Matrices, Eigen Values, Eigen Vectors

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
4.	Introduction to Unit I, Matrices	1	02-09-2026		TLM1	CO1	T1,T2	
5.	Rank of a matrix	1	03-09-2026		TLM1	CO1	T1,T2	
6.	Echelon form	1	07-09-2026		TLM1	CO1	T1,T2	
7.	Normal form	1	08-09-2026		TLM1	CO1	T1,T2	
8.	Inverse by Gauss-Jordan method	1	09-09-2026		TLM1	CO1	T1,T2	
9.	**TUTORIAL 1**	1	10-09-2026		TLM3	CO1	T1,T2	
10.	System of Linear Equations	1	11-09-2026		TLM1	CO1	T1,T2	
11.	Homogeneous System of Equations	1	15-09-2026		TLM1	CO1	T1,T2	
12.	Homogeneous System of Equations	1	16-09-2026		TLM1	CO1	T1,T2	
13.	Non-Homogeneous System of Equations	1	17-09-2026		TLM1	CO1	T1,T2	
14.	Non-Homogeneous System of Equations	1	18-09-2026		TLM1	CO1	T1,T2	
15.	Gauss Elimination Method	1	21-09-2026		TLM1	CO1	T1,T2	
16.	Gauss-Seidel Method	1	22-09-2026		TLM1	CO1	T1,T2	
17.	**TUTORIAL 2**	1	23-09-2026		TLM3	CO1	T1,T2	
18.	Eigen values, Eigen vectors	1	24-09-2026		TLM1	CO1	T1,T2	
19.	Eigen values, Eigen vectors	1	25-09-2026		TLM1	CO1	T1,T2	
20.	Properties	1	28-09-2026		TLM1	CO1	T1,T2	
No. of classes required to complete UNIT-I : 17					No. of classes taken:			

UNIT-II: Diagonalization of a Matrix

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
21.	Introduction to Unit II	1	29-09-2026		TLM1	CO2	T1,T2	
22.	**TUTORIAL 3**	1	30-09-2026		TLM3	CO1	T1,T2	
23.	Cayley-Hamilton Theorem	1	01-09-2026		TLM1	CO2	T1,T2	
24.	Finding Inverse and Powers of matrix	1	05-10-2026		TLM1	CO2	T1,T2	
25.	Diagonalisation of a matrix	1	06-10-2026		TLM1	CO2	T1,T2	
26.	Diagonalisation of a matrix	1	07-10-2026		TLM1	CO2	T1,T2	
27.	**TUTORIAL 4**	1	08-10-2026		TLM3	CO2	T1,T2	
28.	Quadratic Forms, Nature of Quadratic Forms	1	09-10-2026		TLM1	CO2	T1,T2	
29.	Reduction of Quadratic form to Canonical form	1	12-10-2026		TLM1	CO2	T1,T2	
30.	Orthogonal Transformation	1	12-10-2026		TLM1	CO2	T1,T2	
31.	**TUTORIAL 5**	1	13-10-2026		TLM3	CO2	T1,T2	
No. of classes required to complete UNIT-II: 11					No. of classes taken:			

UNIT-III: Calculus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
32.	Introduction to Unit III, Mean Value theorems	1	22-10-2026		TLM1	CO3	T1,T2	
33.	Rolle's theorem	1	23-10-2026		TLM1	CO3	T1,T2	
34.	Rolle's theorem	1	26-10-2026		TLM1	CO3	T1,T2	
35.	**TUTORIAL 6**	1	27-10-2026		TLM3	CO3	T1,T2	
36.	Lagrange's mean value theorem	1	28-10-2026		TLM1	CO3	T1,T2	
37.	Lagrange's mean value theorem	1	02-11-2026		TLM1	CO3	T1,T2	

I MID EXAMINATIONS (29-10-2026 TO 31-10-2026)

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
38.	Cauchy's mean value theorem	1	03-11-2026		TLM1	CO3	T1,T2	
39.	Taylor's theorem	1	04-11-2026		TLM1	CO3	T1,T2	
40.	Maclaurin's theorem	1	05-11-2026		TLM1	CO3	T1,T2	
41.	Taylor's series	1	06-11-2026		TLM1	CO3	T1,T2	
42.	Maclaurin's series	1	09-11-2026		TLM1	CO3	T1,T2	
43.	Problems and applications	1	10-11-2026		TLM1	CO3	T1,T2	
44.	**TUTORIAL 7**	1	11-11-2026		TLM3	CO3	T1,T2	
No. of classes required to complete UNIT-III		13			No. of classes taken:			

UNIT-IV: Partial differentiation and Applications (Multi variable Calculus)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
45.	Introduction to Unit IV	1	12-11-2026		TLM1	CO4	T1,T2	
46.	Functions of several variables.	1	13-11-2026		TLM1	CO4	T1,T2	
47.	Continuity and Differentiability	1	16-11-2026		TLM1	CO4	T1,T2	
48.	Partial Derivatives	1	17-11-2026		TLM1	CO4	T1,T2	
49.	Total derivatives, Chain rule	1	18-11-2026		TLM1	CO4	T1,T2	
50.	Euler's theorem	1	19-11-2026		TLM1	CO4	T1,T2	
51.	Taylor's Series expansion	1	20-11-2026		TLM1	CO4	T1,T2	
52.	Maclaurin's series expansion	1	23-11-2026		TLM1	CO4	T1,T2	
53.	Jacobian	1	24-11-2026		TLM1	CO4	T1,T2	
54.	**TUTORIAL 8**	1	25-11-2026		TLM3	CO4	T1,T2	
55.	Functional Dependence	1	26-11-2026		TLM1	CO4	T1,T2	
56.	Maxima and Minima	1	27-11-2026		TLM1	CO4	T1,T2	
57.	Maxima and Minima	1	30-11-2026		TLM1	CO4	T1,T2	
58.	Lagrange Multiplier Method	1	01-12-2026		TLM1	CO4	T1,T2	
59.	**TUTORIAL 9**	1	02-12-2026		TLM3	CO4	T1,T2	
No. of classes required to complete UNIT-IV		15			No. of classes taken:			

UNIT-V: Multiple Integrals

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
60.	Introduction to Unit-V	1	03-12-2026		TLM1	CO5	T1,T2	
61.	Double Integrals - Cartesian coordinates	1	04-12-2026		TLM1	CO5	T1,T2	
62.	Double Integrals - Cartesian coordinates	1	07-12-2026		TLM1	CO5	T1,T2	
63.	Double Integrals- Polar co ordinates	1	08-12-2026		TLM1	CO5	T1,T2	
64.	**TUTORIAL 10**	1	09-12-2026		TLM3	CO5	T1,T2	
65.	Change of order of Integration	1	10-12-2026		TLM1	CO5	T1,T2	
66.	Triple Integrals - Cartesian coordinates	1	11-12-2026		TLM1	CO5	T1,T2	
67.	Change of variables Cartesian to polar	1	14-12-2026		TLM1	CO5	T1,T2	
68.	**TUTORIAL 11**	1	15-12-2026		TLM3	CO5	T1,T2	
69.	Change of variables Cartesian to spherical	1	16-12-2026		TLM1	CO5	T1,T2	
70.	Change of variables Cartesian to cylindrical	1	17-12-2026		TLM1	CO5	T1,T2	

71.	Finding area by double Integral	1	18-12-2026		TLM1	CO5	T1,T2	
72.	Finding Volume by double and triple Integral	1	21-12-2026		TLM1	CO5	T1,T2	
73.	**TUTORIAL 12**	1	22-12-2026		TLM3	CO5	T1,T2	
74.	Finding Volume by triple Integral	1	23-12-2026		TLM1	CO5	T1,T2	
75.	Revision	1	24-12-2026					
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
76.	Singular Value Decomposition	1	14-10-2026		TLM2	CO2	T1,T2	
No. of classes		1			No. of classes taken:			
II MID EXAMINATIONS (28-12-2026 TO 31-12-2026)								

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

PART-C

EVALUATION PROCESS (R26 Regulation):

Evaluation Task	Marks
I-Descriptive Examination (Unit I, Unit II & Unit III(Half of Syllabus))	M1=25
II- Descriptive Examination (UNIT III (Remaining Half of Syllabus), Unit IV & Unit V)	M2=25
Five quiz tests (one for each unit) (comprising of 10 / 05 short answer questions of one / two marks each respectively) / assignments / presentation / case studies / mini project	M3=50
Total Internal Marks = M1+M2+M3	M=100
Cumulative Internal Examination (CIE): 40% of Mid marks	40
Semester End Examination (SEE): 60%	60
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization to develop to the solution of complex engineering problems.
PO 2	**Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.
PO 3	**Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required.
PO 4	**Conduct Investigations of Complex Problems**: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions.

PO 5	**Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems.
PO 6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment.
PO 7	**Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws.
PO 8	Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO 9	**Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO 10	**Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO 11	**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

Ms.K.NAGA LAKSHMI	**Dr. K. R.KAVITHA**	**Dr.K.R. KAVITHA**	**Dr. T. SATYANARYANA**
Course Instructor	Course Coordinator	Module Coordinator	HOD

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R-26 Regulation
Engineering Graphics
Weekly Practice Learning Schedule

6 Weeks Manual Engineering Drawing + 6 Weeks AutoCAD Drawing

Total: 36 Contact Hours | 3 Contact Hours per Week

1. Course Basis and Structure

This problem bank is prepared directly from the uploaded R-26 Engineering Graphics syllabus. The syllabus lists Section A – Manual Engineering Drawing (Exercises 1–10) and Section B – Computer-Aided Engineering Graphics (CAD) (Exercises 11–20). It also specifies that students shall carry out all practical exercises of Sections A and B. The course is listed as R26XXXX Engineering Graphics, ESE-2, L-T-P 0-1-3, with 2.5 credits.

The 12-week plan below groups the prescribed practical exercises into six weeks of manual drawing followed by six weeks of CAD drawing. Each week contains 3 contact hours and a set of graded/practice problems suitable for laboratory or studio execution.

2. Course Education Objective: The course aims to

1. Develop spatial visualization and graphical communication skills for representing engineering objects, components, structures and systems.
2. Introduce the principles, conventions and standards of engineering graphics, including geometrical constructions, scales, dimensioning, projections and sectional representation.
3. Develop the ability to visualize and represent three-dimensional engineering entities through orthographic, isometric, sectional and surface-development techniques.
4. Develop proficiency in computer-aided engineering graphics, including 2D drafting, 3D modelling, visualization and generation of engineering drawings. 5. Enable students to communicate engineering design information effectively through freehand sketches, conventional drawings and digital CAD models across different engineering disciplines.

3Course Outcomes

At the end of the course, student will be expected to

- CO1 – Apply standard engineering graphics principles and conventions to prepare accurate sketches and engineering drawings.

- CO2 – Visualize and represent three-dimensional objects and systems using projection, orthographic, isometric, sectional and surface-development techniques.
- CO3 – Interpret and transform engineering representations, including conversion between 2D drawings, 3D views and physical objects.
- CO4 – Use CAD tools to create, modify and communicate 2D drawings and 3D models with dimensions, annotations, symbols and features.
- CO5 – Communicate engineering design information effectively through graphical representations, CAD models and engineering drawings.

CO–PO Articulation Matrix

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1	1	1	2	-	-	2	1	-	2	1	-
CO2	2	2	3	2	2	-	-	2	1	-	2	1	-
CO3	2	3	3	3	3	-	-	2	1	-	2	1	-
CO4	2	2	3	1	3	-	-	2	2	-	2	1	-
CO5	2	1	2	-	3	-	-	2	2	-	2	1	-
Avg.	**2.2**	**1.8**	**2.4**	**1.75**	**2.6**	**-**	**-**	**2**	**1.4**	**-**	**2**	**1**	**-**

Legend: 3 = High Correlation | 2 = Medium Correlation | 1 = Low Correlation | – = No Correlation

Note: *The correlation levels reflect the strength of the mapping between each Course Outcome and the corresponding Program Outcome, based on the extent to which the course content, activities and assessments contribute to the attainment of that outcome.*

Weekly Practice Learning Schedule

Week	Mode / Syllabus Coverage	Tentative Schedule	Actual Schedule	Main Output
1	Manual – Fundamentals + Engineering Curves Exercises 1–2	04-09-2026		**Sheet 1:** conventions + geometrical curves + conics + cycloid + Involute
2	Manual – Scales + Projection of Points and Straight Lines Exercises 3–4	11-09-2026		**Sheet 2:** Scales + Projection of points+ line projections
3	Manual – Projection of Planes + Solids Exercises 5–6	18-09-2026		**Sheet 3:** planes + solids
4	Manual – Orthographic/Isometric + Sections Exercises 7–8	25-09-2026		**Sheet 4:** Orthographic views + Isometric view
5	Manual – Development of Surfaces Exercise 9	09-10-2026		**Sheet 5:** Sections of solids + Development of surfaces
6	Manual – Freehand Engineering Sketching + Integrated Practice Exercise 10	16-10-2026		**Sheet 6:** component sketches
7	Revision	23-10-2026		
I MID EXAMINATION 29-10-2026 to 31-10-2026				
	Mode / Syllabus Coverage	**Tentative Schedule**	**Actual Schedule**	
8	CAD – Introduction to 2D CAD Exercise 11	06-11-2026		CAD Sheet 1
9	CAD – Geometrical Constructions and Curves Exercise 12	13-11-2026		CAD Sheet 2
10	CAD – Orthographic Views + Basic 3D Modelling Exercises 13–14	20-11-2026		CAD Sheet 3 + 3D model
11	CAD – Engineering Components + Feature Modelling Exercises 15–16	27-11-2026		CAD Sheet 4 + feature model
12	CAD – Sectional Views + Surface Development Exercises 17–18	04-12-2026		CAD Sheet 5
13	CAD – Model to Drawing + Physical Object Recreation Exercises 19–20	11-12-2026		CAD Sheet 6 + final model/drawing
14	Revision	18-12-2026		
II MID EXAMINATION 28-12-2026 to 30-12-2026				

Laboratory Examination:

Evaluation Task	Marks
For Every Experiment_ Day-to-Day Work	A1 = 5
For Every Experiment_ Viva-voce & record	B1 = 5
Evaluated for best 10 experiments C1= 10X(A1+B1)	C1=100
Cumulative Internal Examination (CIE): 50%(C1)	50
Semester End Examination (SEE)	50
Total Marks = CIE + SEE	100

Program Educational Objectives (PEOs):

PEO1: To provide students with sound mathematical, engineering, and multidisciplinary knowledge to solve Aerospace and Allied Engineering problems.

PEO2: To prepare students to excel in higher education programs and to succeed in industry/academia profession.

PEO3: To inculcate ethical attitude, leadership qualities, problem solving abilities and life-long learning for a successful professional career.

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization as specified in WK1 to WK4 respectively to develop the solution of complex engineering problems. (WK1 to WK4)
PO2: Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO3: Design/development of solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet the identified needs with appropriate consideration for the public health and safety, whole-life cost, net zero carbon, culture, society, and environment as required. (WK5)
PO4: Conduct investigations of complex problems:: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8)
PO5: Engineering Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 to WK6)
PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy,

health, safety, legal framework, culture and environment. (WK1, WK5 and WK7)
PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion, adhere to national and international laws. (WK9)
PO8: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams/multidisciplinary teams.
PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, considering cultural, language and learning differences.
PO10: Project management and finance: Apply knowledge and understanding of the engineering management principles and economic decision-making apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for: i) independent and life-long learning ii) adaptability to new and emerging technologies iii) critical thinking in the broadest context of technological change. (WK8)

WK	Knowledge and Attitude Profile
WK1	A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
WK2	Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
WK3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
WK4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
WK5	Knowledge, including efficient resource use, environmental impacts, whole-life cost, re use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
WK6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
WK7	Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public

WK	Knowledge and Attitude Profile
	safety and sustainable development.
WK8	**Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.**
WK9	**Ethics, inclusive behaviour and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.**

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

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT
PART-A

Course Instructor	**:** Dr. T. Satyanarayana		
Course Name & Code	**:** Physics for Mechanical Systems	**Credits :**	1.5
L-T-P Structure	**:** 0-0-**3**	**A.Y. :**	2026-27
Program/Sem./Branch	: B.Tech/I/ASE	**Regulations**:	R23

Course Objectives

- To develop an experimental understanding of fundamental principles of optics, mechanics, oscillations, ultrasonics, and quantum physics through laboratory investigations.
- To determine important optical parameters, mechanical properties, wave characteristics, and physical constants using appropriate experimental techniques and measurement methods.
- To develop practical skills in experimental measurement, data analysis, error estimation, interpretation of observations, and verification of fundamental physical principles.

Course Outcomes

At the end of the course, students will be able to:

CO1 : Apply the principles of interference, diffraction, and polarization to determine optical parameters such as wavelength, grating element, radius of curvature, and Brewster angle through experimental methods. **K3 (Apply)**

CO2 : Analyze the mechanical properties of materials by experimentally determining Young's modulus and rigidity modulus using bending and torsional methods. **K4 (Analyze)**

CO3 : Apply the principles of mechanical oscillations, standing waves, and ultrasonic wave propagation to determine acceleration due to gravity, radius of gyration, frequency, and ultrasonic velocity. **K3 (Apply)**

CO4 : Analyze the resolving capability of optical instruments by experimentally determining the resolving power of a telescope and relating it to diffraction and the ability to distinguish closely spaced objects. **K4 (Analyze)**

CO5 : Apply the principles of quantum physics and photoelectric effect to estimate Planck's constant experimentally and interpret the relationship between photoelectric observations and quantum theory. **K3 (Apply)**

Course Articulation Matrix

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	H	–	H	M	–	–	–	L	M	–
CO2	H	H	–	H	M	–	–	–	L	M	–
CO3	H	H	–	H	M	–	–	–	L	M	–
CO4	H	H	–	H	H	–	–	–	L	M	–
CO5	H	H	–	H	M	–	–	–	L	M	–

Correlation Levels

- **H** – High correlation; **M** – Moderate correlation; **L** – Low correlation

LIST OF EXPERIMENTS FOR PHYSICS FOR MECHANICAL SYSTEMS (PMS) LAB

(Any TEN of the following listed experiments)

(Out of which any TWO experiments may be conducted in virtual mode)

1. Laser: Determination of wavelength and grating element.
2. Sonometer: Verification of laws of stretched string.
3. Determination of ultrasonic velocity in a given liquid.
4. Estimation of Planck's constant using photoelectric effect.
5. Determination of Rigidity modulus of material of a wire-dynamic method (Torsional pendulum).
6. Determination of radius of curvature of given plano-convex lens by forming Newton's rings.
7. Determination of Acceleration due to gravity and Radius of gyration using Compound pendulum.
8. Determination of frequency of electrically maintained tuning fork by Melde's experiment.
9. Determination of the resolving power of telescope.
10. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
11. Verification of Brewster's Law.
12. Determination of temperature coefficients of a thermistor.
13. Determination of dielectric constant of given capacitor by charging and discharging method.
14. Study the variation of magnetic field along the axis of a current carrying circular coil by Stewart & Gee's method.
15. Determination of thickness of thin object by wedge method.
16. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
17. Young's modulus of given material of wooden scale by non –uniform bending method.
18. Determination of Hall voltage and Hall coefficients of a given semiconductor using Hall Effect.

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text Book of Practical Physics"- S Chand Publishers, 2017.

V-Lab: vlab.co.in

EVALUATION PROCESS

Evaluation Task	Marks
For Every Experiment_ Day-to-Day Work	A1 = 5
For Every Experiment_ Viva-voce & record	B1 = 5
Evaluated for best 10 experiments C1= 10X(A1+B1)	C1=100
Cumulative Internal Examination (CIE): 50%(C1)	50
Semester End Examination (SEE)	50
Total Marks = CIE + SEE	100

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PART-B

Course Delivery Plan (Lesson Plan): ASE

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	T-L Methods	Learning Outcome COs	Textbook followed	HOD Sign
1.	Introduction	3	01/09/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
2.	Demonstration	3	08/09/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
3.	Experiment 1	3	15/09/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	

4.	Experiment 2	3	22/09/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
5.	Demonstration	3	29/09/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
6.	Experiment 3	3	06/10/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
7.	Experiment 4	3	13/10/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
8.	Experiment 5	3	27/10/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
10.	Experiment 6	3	03/11/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
11.	Experiment 7	3	10/11/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
12.	Experiment 8	3	17/11/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
13.	Repetition	3	24/11/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
14.	Experiment 9 (Virtual Lab)	3	01/12/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
15.	Experiment10 (Virtual Lab)	3	08/12/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
16.	Revision	3	15/12/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	
17.	Internal Exam	3	22/12/2026		TLM-4	CO1, CO2, CO3, CO4 & CO5	T1	

Teaching-Learning Methods			
TLM-1	Chalk and talk	**TLM-4**	Demonstration (Lab/Field Visit)
TLM-2	PPT/A illustrations	**TLM-5**	ICT (NPTEL/Swayam Prabha /MOOCS)
TLM-3	Tutorial/Quiz/Assignment	**TLM-6**	Group Discussion/Project

PROGRAM OUT COMES (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 contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 8	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 9	**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 10	**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 11	**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.

Course Instructor	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Dr. T. Satyanarayana	Dr. T. Satyanarayana	Dr. T. Satyanarayana	Dr. T. Satyanarayana

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

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

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

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

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

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT
PART-A

Course Instructor	**:** Dr. T. Satyanarayana	
Course Name & Code	: Physics for Mechanical Systems	Credits: 3
L-T-P Structure	: 3-0-0	A.Y.: 2026-27
Program/Sem./Branch	: B.Tech/I/Aerospace Engineering	Regulations: R26

Pre-requisite **:** Basic Knowledge of Physics

Course Objectives:

1. To provide students with a strong foundation in wave optics concepts such as interference, diffraction and polarization along with their applications in optical measurements.
2. To introduce the fundamentals of crystallography and X-ray diffraction methods for understanding crystal structures and material characterization.
3. To equip students with the basic principles of quantum mechanics and quantum computing, including quantum states, tunneling, superposition and secure communication.
4. To familiarize students with oscillations, vibration control systems, lasers and precision engineering applications in modern industries.
5. To impart knowledge on the principles of ultrasonics and non-destructive testing methods for defect detection and quality inspection.

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

CO1	Examine the principles of interference, diffraction and polarization and utilize optical analysis techniques in engineering applications. K3 (Apply)
CO2	Analyze crystal structures, diffraction patterns and material characterization using X-ray diffraction methods. K4 (Analyze)
CO3	Interpret the concepts of quantum mechanics and quantum computing and apply for secure communication systems. K3 (Apply)
CO4	Analyze oscillatory systems, vibration control mechanisms and laser-based metrology techniques. K4 (Analyze)
CO5	Evaluate ultrasonic testing and non-destructive testing methods for defect identification and quality assessment. K5 (Evaluate)

Course Articulation Matrix (Correlation between COs & POs):

Course Designed by				Division of Physics, Freshman Engineering Department								
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	
CO1	**H**	**M**	**L**	**M**	**H**	**–**	**–**	**–**	**L**	**–**	**M**	
CO2	**H**	**H**	**L**	**H**	**H**	**–**	**–**	**–**	**L**	**–**	**M**	
CO3	**H**	**M**	**L**	**L**	**M**	**–**	**–**	**–**	**L**	**–**	**H**	
CO4	**H**	**H**	**L**	**H**	**H**	**L**	**–**	**L**	**L**	**–**	**M**	
CO5	**H**	**H**	**L**	**H**	**H**	**M**	**–**	**L**	**L**	**–**	**M**	
1 = Slight (Low)				**2** = Moderate (Medium)				**3** = Substantial (High)				

Correlation levels: H = High (3), M = Moderate (2), L = Low (1), – = No correlation (0)

Learning Resources:

Text books:

1. Avadhanulu, M.N., Kshirsagar, P.G., & Murthy, T.V.S.A., A textbook of engineering physics, S. Chand Publishing (2022)
2. P.K. Palaniswamy, Engineering Physics, SciTech Publications (2019).

Reference Books:

1. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker, John Wiley & Sons publications, 12th Edition (2021).
2. Solid State Physics by S. O. Pillai, New Age International Publishers, 9th edition (2023).
3. Concepts of Modern Physics by Arthur Beiser, Shobit Mahajan & S. Rai Choudhury MC Graw Hill, 8th Edition (2026).
4. Nielsen & Chuang, Quantum Computation & Quantum Information, Cambridge University Press, 10th Edition, (2010).
5. D. J. Griffiths, Introduction to Electrodynamics, Cambridge University Press, 5th Edition (2023).

Web Resources

1. NPTEL. National Programme on Technology Enhanced Learning. https://nptel.ac.in
2. MIT Open Course Ware, Physics courses. https://ocw.mit.edu
3. Georgia State University, Hyper Physics. http://hyperphysics.phy-astr.gsu.edu
4. PhET Interactive Simulations, University of Colorado Boulder. https://phet.colorado.edu
5. American Concrete Institute, (2021). ACI 228.2R: Nondestructive test methods for evaluation of concrete in structures. https://www.concrete.org

PART-B

Course Delivery Plan (Lesson Plan): ASE

Unit-I: APPLIED WAVE OPTICS Course Outcome: CO1; Textbook: T1

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Interference: Superposition Principle and Coherence	1	02-09-2026		TLM-2	
2	Types of Interference	1	03-09-2026		TLM-2	
3	Interference in Thin-film (reflection)	1	05-09-2026		TLM-2	
4	Newton's rings	1	09-09-2026		TLM-2	
5	Determination of wavelength and refractive index using Newton's rings	1	10-09-2026		TLM-2	
6	Diffraction: Fresnel and Fraunhofer diffraction	1	11-09-2026		TLM-2	
7	Fraunhofer diffraction due to single slit	1	12-09-2026		TLM-2	
8	Fraunhofer diffraction due to double slit and N-slits (qualitative)	1	16-09-2026		TLM-2	
9	Diffraction Grating and grating spectrum	1	17-09-2026		TLM-2	
10	Dispersive and Resolving power of a grating	1	18-09-2026		TLM-2	
11	Polarization: Types of polarized lights	1	19-09-2026		TLM-2	
12	Tutorial	1	23-09-2026		TLM-3	
13	Nicols Prism	1	24-09-2026		TLM-2	
14	Quarter and Half wave plate	1	25-09-2026		TLM-2	
No. of classes required to complete UNIT-I: 14			**No. of classes taken:**			

Unit-II: CRYSTALLOGRAPHY AND MATERIAL CHARACTERIZATION

Course Outcome: CO2; Textbook: T1

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13	Crystallography: Space lattice, Basis and Unit cell	1	26-09-2026		TLM-2	
14	Lattice parameters, Crystal systems and Bravais lattices	1	30-09-2026		TLM-3	
15	Co-ordination number and Packing fraction of SC and BCC	1	01-10-2026		TLM-3	
16	FCC	1	03-10-2026		TLM-3	
17	Miller indices	1	07-10-2026		TLM-2	
18	Inter-planar spacing between successive (hkl) planes	1	08-10-2026		TLM-2	
19	Tutorial	1	09-10-2026		TLM-3	
20	Bragg's law	1	10-10-2026		TLM-2	
21	X-ray Diffractometer	1	14-10-2026		TLM-2	
22	Crystal structure determination by Laue's method	1	15-10-2026		TLM-2	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

Unit-III: INTRODUCTION TO QUANTUM MECHANICS & QUANTUM COMPUTING

Course Outcome: CO3; Textbook: T1, T2

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
25	Quantum Mechanics: de Broglie concept of matter waves, Heisenberg's uncertainty principle	1	16-10-2026		TLM-2	
26	Wave function and postulates of quantum mechanics	1	17-10-2026		TLM-3	
27	Schrödinger's time-dependent wave equation	1	22-10-2026		TLM-2	
28	Schrödinger's time-independent wave equation	1	23-10-2026		TLM-2	
29	Particle in a one-dimensional potential well	1	24-10-2026		TLM-2	
30	Quantum tunnelling	1	28-10-2026		TLM-3	
31	Quantum Computing: Introduction;	1	04-11-2026		TLM-2	
32	Classical bits vs qubits	1	05-11-2026		TLM-2	
33	Superposition and entanglement	1	06-11-2026		TLM-2	
34	Basic quantum operations	1	07-11-2026		TLM-2	
35	Tutorial	1	11-11-2026		TLM-3	
36	Hadamard gate, Pauli-X gate	1	12-11-2026		TLM-2	
37	Idea of quantum measurement	1	13-11-2026		TLM-2	
No. of classes required to complete UNIT III : 13				**No. of classes taken:**		

Unit-IV: OSCILLATIONS AND LASER-BASED METROLOGY

Course Outcome: CO4; Textbook: T1, R4

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
38	Oscillations of springs	1	14-11-2026		TLM-2	

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
39	Series and parallel combination of springs (quantitative)	1	18-11-2026		TLM-2	
40	Tutorial	1	19-11-2026		TLM-3	
41	Stiffness factor and its significance	1	20-11-2026		TLM-2	
42	Damping: over-, under- and critical damping (qualitative)	1	21-11-2026		TLM-2	
43	Forced oscillations and resonance	1	25-11-2026		TLM-2	
44	Sharpness of resonance and Quality factor (Q)	1	26-11-2026		TLM-2	
45	Lasers: Absorption, spontaneous and stimulated emission, Population inversion	1	27-11-2026		TLM-3	
46	Three-level and Four-level laser systems	1	28-11-2026		TLM-2	
47	Construction and working of Ruby laser	1	02-12-2026		TLM-2	
48	Construction and working of He-Ne laser	1	03-12-2026		TLM-2	
49	Applications: high-power lasers in CNC laser cutting and welding	1	04-12-2026		TLM-2	
No. of classes required to complete UNIT IV: 11				**No. of classes taken:**		

Unit-V: ULTRASONICS AND NON-DESTRUCTIVE TESTING

Course Outcome: CO5; Textbook: T1

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
50	Ultrasonics: Introduction and characteristics of ultrasonic waves	1	05-12-2026		TLM-2	
51	Production by magnetostriction method	1	09-12-2026		TLM-2	
52	Production by piezoelectric method	1	10-12-2026		TLM-2	
53	Tutorial	1	11-12-2026		TLM-3	
54	Detection of ultrasonic waves	1	12-12-2026		TLM-2	
55	Acoustic grating	1	16-12-2026		TLM-2	
56	Applications of ultrasonics	1	17-12-2026		TLM-2	
57	Non-Destructive Testing (NDT): Introduction and basic principles	1	18-12-2026		TLM-2	
58	Pulse-echo system through transmission mode	1	19-12-2026		TLM-2	
59	Pulse-echo system through reflection mode	1	23-12-2026		TLM-2	
60	Applications of NDT for defect detection and quality inspection	1	24-12-2026		TLM-2	
61	Tutorial/Quiz	1	26-12-2026		TLM-3	
No. of classes required to complete UNIT V: 12				**No. of classes taken:**		

PART-C

Teaching-Learning Methods			
TLM-1	Chalk and talk	**TLM-4**	Demonstration (Lab/Field Visit)
TLM-2	PPT/A illustrations	**TLM-5**	ICT (NPTEL/Swayam Prabha /MOOCS)
TLM-3	Tutorial/Quiz/Assignment	**TLM-6**	Group Discussion/Project

EVALUATION PROCESS (R26 Regulation)

Evaluation Task	Marks
I – Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=25
II – Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=25
Five quiz tests (one for each unit) (comprising of 10 / 05 short answer questions of one / two marks each respectively) / assignments / presentation / case studies / mini project	M3=50
Internal Marks (M)=M1+M2+M3	M=100
Cumulative Internal Examination (CIE): 40%(M)	40
Semester End Examination (SEE)	60
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.
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Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Dr. T. Satyanarayana	Dr. T. Satyanarayana	Dr. T. Satyanarayana	Dr. T. Satyanarayana

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L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
http://lbrce.ac.in/ase/index.php, hodece@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF AEROSPACE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. Phaneendra Kanakamedala

Course Name & Code : COMPUTATIONAL THINKING & PROBLEM SOLVING THROUGH PYTHON LAB - A2610017

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

Program/Sem/Sec : B. Tech/ASE/I/A **A.Y.:** 2026-27

PREREQUISITE: INTRODUCTION TO PROGRAMMING

COURSE EDUCATIONAL OBJECTIVE:

The main objectives of the course are to

- Develop basic Python programming skills using variables, data types, operators, input/output statements, conditional statements, loops, and appropriate coding practices.
- Develop the ability to represent and manipulate different forms of data using Python strings, lists, tuples, dictionaries, and comprehensions.
- Apply functions, recursion, lambda expressions, modules, and functional programming constructs to develop modular and reusable Python programs.
- Introduce object-oriented programming concepts such as classes, objects, encapsulation, inheritance, polymorphism, operator overloading, and composition for implementing Python-based solutions.
- Develop practical skills in file processing, exception handling, and basic data analysis and visualization using Python libraries and integrate these techniques to solve computational problems.

COURSE OUTCOMES (CO):

CO	Course Outcome Description	Knowledge Level (K)#
CO1	Apply Python variables, data types, operators, input/output, conditional statements, loops, and coding practices to solve basic computational problems.	**K3**
CO2	Apply strings, lists, tuples, dictionaries, and comprehensions to represent, manipulate, and process different types of data.	**K3**
CO3	Apply functions, lambda expressions, recursion, modules, and functional programming constructs to develop modular Python programs.	**K3**
CO4	Apply classes, objects, encapsulation, inheritance, polymorphism, operator overloading, and composition to implement object-oriented Python solutions.	**K3**
CO5	Implement file processing, exception handling, and basic data analysis and visualization using Python libraries for solving computational problems.	**K3**

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

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	H	M	L	H	–	–	L	–	–	L			
CO2	H	H	M	M	H	–	–	L	–	–	L			
CO3	H	H	H	M	H	–	–	L	L	–	M			
CO4	H	H	H	M	H	L	–	M	M	L	M			
CO5	H	H	H	H	H	L	L	M	M	M	M			

SYLLABUS

Lab Requirements (tools / software to carry out the experiments):

- Python 3.x interpreter (C Python, from python.org).
- IDE / editor: Thonny or IDLE (beginner-friendly), VS Code (Python extension) or PyCharm Community.
- pip package manager with the NumPy, pandas and Matplotlib libraries for the data-analysis exercises.
- Notebook environment: Jupyter Notebook or Google Colab (no install) for experimentation and plotting.
- Operating system: Windows, Linux or macOS, 64-bit, with 4 GB RAM or more.
- No-install alternative: Google Colab, Replit or Programiz Python for practice in a browser.

List of Experiments

Exercise 1: Getting Started with Python

1. Write and run a Python program that prints “Hello, World!” along with the Python version in use. Note the difference between running a saved script from the terminal and typing the same statements in the interactive shell.
2. Write a Python program that reads a name and an age from the user and prints a personalised greeting.
3. Write a Python program that reads two numbers and prints their sum, difference, product, quotient and remainder, each on a labelled line.
4. Write a Python program to compute simple interest given principal, rate, and time.
5. Write a Python program to compute the area and perimeter of a rectangle from user input.
6. Write a Python program to swap two numbers without using a third variable.

Exercise 2: Conditionals

1. Write a Python program to compute the Body Mass Index (BMI) from height and weight, rounded to two decimal places, and classify it as Underweight, Normal, Overweight or Obese using if-elif-else.
2. Write a menu-driven Python program to convert a temperature between Celsius, Fahrenheit and Kelvin based on the user's choice.
3. Write a Python program to find the largest of three numbers.
4. Write a Python program to Check whether a given year is a leap year.

Exercise 3: Write a Python program to

1. Determine whether a number is positive, negative, or zero.
2. Check if a given number is prime
3. Convert temperature between Celsius and Fahrenheit based on user choice
4. Compute and display the area of a valid triangle using Heron's formula, with inline comments explaining each step.

Exercise 4: Loops, Number Problems and Patterns

1. Use a for loop to print the first n Fibonacci terms, and a while loop to test whether a number is prime (using break, printing the number of division tests).
2. Use a while loop to compute the GCD and LCM of two integers using Euclid's algorithm.
3. Find the first n prime numbers using nested loops with break.
4. Sum of first N natural numbers

Exercise 5: String Processing

1. Write a function that checks whether a string is a palindrome using slicing and string methods, ignoring spaces, punctuation and case; justify whether a string or a list of characters is the better structure.
2. Write a script that counts the vowels, consonants, digits and special characters in a user-provided paragraph.
3. Write a script that sanitizes a full name with irregular capitalization and excess spaces using .strip() and .title(), and extracts the initials.

Exercise 6: Lists and List Comprehensions

1. Remove duplicates from a list of sensor readings, first without set() and then with set(); compare the two approaches for time complexity and readability.
2. Use a list comprehension to filter out noise readings outside a realistic range (e.g., -40°C to 85°C).
3. Compute and display the average, maximum and minimum of the filtered list.

Exercise 7: Write a Python Program to

1. Find the second-largest element in a list of exam scores.
2. Merge two sorted lists of student roll numbers into a single sorted list.
3. Generate squares of all even numbers from 1 to 50 using list comprehension.

Exercise 8: Dictionaries and Tuples

1. Create a dictionary of student records keyed by roll number with (Name, Marks) tuples as values; justify why a dictionary is preferable to a list of tuples for lookup.
2. Build a word-frequency dictionary from a text paragraph (case-insensitive). (Count the frequency of each word in a paragraph using a dictionary)
3. Search the student dictionary by roll number, assign grades and identify the highest scorer.

Exercise 9: Recursion vs Iteration

1. Write a recursive function fibonacci_recursive(n) that returns the n-th Fibonacci term.
2. Write an iterative function fibonacci_iterative(n) using a loop.
3. Compute the GCD of two numbers recursively using the Euclidean algorithm.
4. Compute factorial using recursion

Exercise 10: File Handling and Modular Workflow

1. Create a file student_records.txt and write five lines of data formatted as RollNo, Name, Marks.
2. Read the file, identify students scoring above 75 and write them to distinction_list.csv using context managers.
3. Count the words, lines, and characters in a given text file.
4. Read a text file of daily temperature readings and write the maximum, minimum, and average to an output file

Exercise 11: Exception Handling

1. Write a program to compute the real roots of a quadratic equation, handling all cases (real distinct, real equal, no real roots).
2. Wrap the parsing and calculation in a try-except block handling ValueError and ZeroDivisionError, with a finally block logging attempts to calculation_log.txt.
3. Package the logic into a reusable function solve_quadratic(a, b, c) suitable for import by other modules.

Reference Books:

1. Sweigart, A. (2025). Automate the boring stuff with Python: Practical programming for total beginners (3rd ed.). No Starch Press.
2. McKinney, W. (2022). Python for data analysis: Data wrangling with pandas, NumPy, and Jupyter (3rd ed.). O'Reilly Media.
3. Wing, J. M. (2006). Computational thinking. Communications of the ACM, 49(3), 33–35. https://doi.org/10.1145/1118178.1118215

Web References:

- Python Software Foundation – The Python Tutorial: https://docs.python.org/3/tutorial/
- NPTEL – Python for Data Science: https://nptel.ac.in

PART-B:

COURSE DELIVERY PLAN (LESSON PLAN):

S.NO	Topic to be covered	Number of Hours	Tentative Date of Completion	Actual Date of Completion	HOD Signature
1.	Introduction to Python Programming and Installation of Python IDLE	3	05-09-2026		
2.	Exercise 1: Getting Started with Python	3	19-09-2026		
3.	Exercise 2: Conditional control Structures	3	26-09-2026		
4.	Exercise 3: Python Programs on Conditional Control Structures	3	03-10-2026		
5.	Exercise 4: Loops, Number Problems and Patterns	3	24-10-2026		
6.	Exercise 5: String Processing	3	07-11-2026		
7.	Exercise 6: Lists and List Comprehensions	3	21-11-2026		
8.	Exercise 7: Lists	3	28-11-2026		
9.	Exercise 8: Dictionaries and Tuples	3	05-12-2026		
10.	Exercise 9: Recursion vs Iteration	3	12-12-2026		
11.	Exercise 10: File Handling and Modular Workflow	3	19-12-2026		
12.	Exercise 11: Exception Handling	3	26-12-2026		

PART-C

EVALUATION PROCESS (R26 Regulation):

Evaluation Task	Marks
For Every Experiment_ Day-to-Day Work	A1 = 5
For Every Experiment_ Viva-voce & record	B1 = 5
Evaluated for best 10 experiments C1= 10X(A1+B1)	C1=100
Cumulative Internal Examination (CIE): 50%(C1)	50
Semester End Examination (SEE)	50
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization to develop solutions to complex engineering problems.
PO 2	**Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.
PO 3	**Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required.
PO 4	**Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions.
PO 5	**Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems.
PO 6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for their impact on sustainability with reference to economy, health, safety, legal framework, culture and environment.
PO 7	**Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws.
PO 8	**Individual and Collaborative Teamwork:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO 9	**Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective

	reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO 10	**Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO 11	**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

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

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Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
hodase@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

DEPARTMENT OF AEROSPACE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. PHANEENDRA KANAKAMEDALA
Course Name & Code : - Computational Thinking and Problem solving using Python - A2610015
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech-ASE/I SEM / A **A.Y.:** 2026-27
Regulations : R26

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

CO	Course Outcome Description	Knowledge Level (K)#
CO1	Describe the principles of computational thinking and basic algorithms, pseudocode, and flowcharts used for problem solving.	K2
CO2	Apply variables, operators, conditional statements, loops, and nested control structures to develop Python programs for solving basic problems.	K3
CO3	Apply appropriate Python data structures such as strings, lists, tuples, and dictionaries to store, organize, and manipulate problem-specific data.	K3
CO4	Apply functions, recursion, modules, and basic debugging techniques to develop modular and reusable Python programs.	K3
CO5	Implement file handling, exception handling, and basic data analysis/visualization techniques to develop an integrated Python-based problem-solving application.	K3

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

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

TEXTBOOKS:

T1	Downey, A. B. (2015). Think Python: How to think like a computer scientist (2nd ed.). O'Reilly Media.
T2	Guttag, J. V. (2021). Introduction to computation and programming using Python: With application to computational modeling and understanding data (3rd ed.). MIT Press.

REFERENCE BOOKS:

R1	Sweigart, A. (2025). Automate the boring stuff with Python: Practical programming for total beginners (3rd ed.). No Starch Press.
R2	McKinney, W. (2022). Python for data analysis: Data wrangling with pandas, NumPy, and Jupyter (3rd ed.). O'Reilly Media.
R3	Wing, J. M. (2006). Computational thinking. Communications of the ACM, 49(3), 33–35. https://doi.org/10.1145/1118178.1118215

WEB REFERENCES:

WR1	Python Software Foundation. (n.d.). The Python tutorial. https://docs.python.org/3/tutorial/
WR2	W3Schools. (n.d.). Python tutorial. https://www.w3schools.com/python/
WR3	NPTEL. (n.d.). Programming, data structures and algorithms using Python. https://nptel.ac.in

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Computational Thinking, Algorithm Design & Flowcharting

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 Python and CO-PO's	1	31-08-2026		TLM 2	
2.	Introduction to Computational thinking	1	01-09-2026		TLM 2	
3.	Problem-solving process	1	02-09-2026		TLM 2	
4.	Algorithms and its Characteristics with Examples	1	03-09-2026		TLM 2	
5.	Pseudo code with Examples	1	07-09-2026		TLM 2	
6.	Flowcharts and its Symbols, , construction rules	1	08-09-2026		TLM 2	
7.	Flow chats, Manual tracing for verification.	1	09-09-2026		TLM 2	
8.	Python Variables and Data types	1	10-09-2026		TLM 2	
9.	Operators and Input Output Statements	1	15-09-2026		TLM 2	
10.	Sample Programs on Data types, Operators	1	16-09-2026		TLM 2	
11.	Introduction to good coding practice, inline comments, and print-based debugging.	1	17-09-2026		TLM 2	
12.	QUIZ / Short answer questions / assignments / presentation	1	21-09-2026		TLM 2	
No. of classes required to complete UNIT-I: 12				**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
13.	Introduction to Conditional statements	1	22-09-2026		TLM 2	
14.	Simple If statements and If—elif Statements	1	23-09-2026		TLM 2	
15.	Sample Programs on Simple If statements and If—elif Statements	1	24-09-2026		TLM 2	
16.	Multiple if.. elif..elif Statements.	1	28-09-2026		TLM 2	
17.	Sample Programs on Multiple if.. elif..elif Statements.	1	29-09-2026		TLM 2	
18.	Loop Control Statements, While loop, Sample Programs on While Loop	1	30-09-2026		TLM 2	
19.	For loop, and Sample Programs	1	01-10-2026		TLM 2	
20.	break, continue, pass	1	05-10-2026		TLM 2	
21.	Nested Loops	1	06-10-2026		TLM 2	
22.	QUIZ / Short answer questions / assignments / presentation	1	07-10-2026		TLM 2	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: Data 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
23.	Python Strings - concept , Slicing, Escape Characters	1	08-10-2026		TLM 2	
24.	String Special Operations, String formatting operator	1	12-10-2026		TLM 2	
25.	Triple quotes , raw string, Unicode strings, Built-in string methods	1	13-10-2026		TLM 2	
26.	Sample Programs on Strings	1	14-10-2026		TLM 2	
27.	Python List - concept , Creating and Accessing Elements	1	22-10-2026		TLM 2	
28.	Updating Lists & Deleting Lists, Basic List operations , Reverse, Indexing	1	26-10-2026		TLM 2	
29.	Slicing & Matrices, Built-in List Functions	1	27-10-2026		TLM 2	
30.	Sample Programs on Lists	1	28-10-2026		TLM 2	
31.	Python Tuples – Introduction, Creating and Deleting Tuples Accessing Values in a Tuple	1	02-11-2026		TLM 2	

32.	Updating tuples , Delete tuple elements, Basic tuple operations	1	03-11-2026		TLM 2	
33.	Indexing , Slicing and Matrices, Built-in tuple functions	1	04-11-2026		TLM 2	
34.	Sample Programs on Tuples	1	05-11-2026		TLM 2	
35.	Introduction to dictionaries and its Functions, Sample Programs on dictionaries	1	09-11-2026		TLM 2	
36.	QUIZ / Short answer questions / assignments / presentation	1	10-11-2026		TLM 2	
No. of classes required to complete UNIT-III: 14				**No. of classes taken:**		

UNIT-IV: Functions & Modular Programming

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
37.	Functions - decomposition of a program into independent, reusable sub-problems.	1	11-11-2026		TLM 2	
38.	Defining and calling a function, Types of functions,	1	12-11-2026		TLM 2	
39.	Function arguments, Anonymous functions	1	16-11-2026		TLM 2	
40.	Global and Local variables, Sample programs on Functions	1	17-11-2026		TLM 2	
41.	Introduction to Recursion - algorithmic thinking applied to self-similar sub-problems.	1	18-11-2026		TLM 2	
42.	Sample Programs on Recursion	1	19-11-2026		TLM 2	
43.	Sample Programs on Recursion	1	23-11-2026		TLM 2	
44.	Basic algorithmic efficiency - informal comparison of iterative vs. recursive approaches and their time trade-offs.	1	24-11-2026		TLM 2	
45.	Modules and built-in libraries, including responsible AI-assisted coding practices.	1	25-11-2026		TLM 2	
46.	QUIZ / Short answer questions / assignments / presentation	1	26-11-2026		TLM 2	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: File Handling, Exception Handling, Data Analysis & Capstone Project

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 File Handling	1	30-11-2026		TLM 2	
48.	Types of Files, Opening and Closing a File**,** Modes of the Files	1	01-12-2026		TLM 2	
49.	Handling text and Binary Files	1	02-12-2026		TLM 2	
50.	seek() and tell() Functions Programs, Sample Programs on Files	1	03-12-2026		TLM 2	
51.	Introduction to Exceptional Handling	1	07-12-2026		TLM 2	
52.	Abstraction of error cases into predictable, manageable patterns.	1	08-12-2026		TLM 2	
53.	Introduction to Data Analysis and visualization	1	09-12-2026		TLM 2	
54.	NumPy and its Functions	1	10-12-2026		TLM 2	
55.	Sample Programs	1	14-12-2026		TLM 2	
56.	Pandas and its Functions	1	15-12-2026		TLM 2	
57.	Sample Programs	1	16-12-2026		TLM 2	
58.	Matplotlib basics and its Functions	1	17-12-2026		TLM 2	
59.	Capstone integration - combining all prior units into one end-to-end project.	1	21-12-2026		TLM 2	
60.	QUIZ / Short answer questions / assignments / presentation	1	22-12-2026		TLM 2	
No. of classes required to complete UNIT-V: 14				**No. of classes taken:**		

Contents 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.	Introduction to Object-Oriented Programming (OOP) in Python	1	23-12-2026		TLM 2	
2.	Introduction to scikit-learn	1	24-12-2026		TLM 2	

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:

Description	From	To	Weeks
Commencement of Class Work	10-08-2026		
Induction Program (Zero Semester)	10-08-2026	19-08-2026	3W
I Phase of Instructions	31-08-2026	17-10-2026	7W
Dasara Holidays	19-10-2026	21-10-2026	3D
I Phase of Instructions (Continued)	22-10-2026	28-10-2026	1W
I Mid Examinations	29-10-2026	31-10-2026	3D
II Phase of Instructions	02-11-2026	26-12-2026	8W
II MID Examinations	28-12-2026	30-12-2026	3D
Semester End Examinations	31-12-2026	13-01-2026	2W

PART-C

EVALUATION PROCESS (R26 Regulation):

Evaluation Task	Marks
I – Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus)	M1=25
II – Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=25
Five quiz tests **(one for each unit)** (comprising of 10 / 05 short answer questions of one / two marks each respectively) / assignments / presentation / case studies / mini project	M3=50
Internal Marks (M)=M1+M2+M3	M=100
Cumulative Internal Examination (CIE): 40%(M)	40
Semester End Examination (SEE)	60
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization to develop solutions to complex engineering problems.
PO 2	**Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.
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Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. Phaneendra Kanakamedala**	**Dr. B. Srinivasa Rao**	**Dr. B. Srinivasa Rao**	**Dr. D. Ratna Kishore**
Signature				

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Phone: 08659-222933, Fax: 08659-222931
FRESHMAN ENGINEERING DEPARTMENT
Web.: https://lbrce.ac.in/fed/index.php Email: hodfed@lbrce.ac.in Ext.: 516

COURSE HANDOUT

PART-A

Name of Course Instructor: B. Sreenivasa Reddy
Course Name & Code : English For Technical Communication & A2610011
L-T-P Structure : 3-0-0 Credits : 03
Program/Sem/Sec : B. Tech, I Sem, **A S E** **A.Y. :** 2026-27

Prerequisite : NIL
Course Educational Objectives :

- Listen the authentic texts to comprehend and respond appropriately as both audience and conversant;
- Communicate in academic and social (formal) contexts with reasonable fluency and accuracy (neutral accent, social and grammatical appropriateness);
- Comprehend the texts of various types for academic, technical and career purposes;
- Write for academic and professional purposes;
- Communicate across cultures that requires a blend of cognitive, interpersonal, and linguistic skills

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

CO1	Comprehend specific information, context, and central ideas from social, academic, or workplace conversations and audio-visual material.	K2
CO2	Apply appropriate social norms to bridge the gaps and collaborate effectively across diverse cultural backgrounds	K3
CO3	Evaluate the content, limitations and ethical aspects of AI tools in communication and language learning, and apply them to create concise, accurate essays/summaries/letters/paraphrases.	K5
CO4	Examine discourse features and writing strategies to participate effectively in informal exchanges, short presentations on technical and general topics and to compile reports/E-mails.	K4
CO5	Construct well-organized paragraphs, essays, critical reviews, and other professional documents suited to academic and workplace contexts.	K6

COURSE ARTICULATION MATRIX (Correlation between COs & POs)

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	2	–	–	1	2	–	–	1	3	1
CO2	1	1	1	–	1	3	2	2	3	3	2
CO3	2	3	2	2	3	1	1	3	2	3	3
CO4	1	2	1	1	1	2	1	1	3	3	3
CO5	1	2	1	1	1	2	1	1	3	3	3

1 = Slight (Low) **2= Moderate (Medium)** **3 = Substantial (High)**

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 Out come (CO)	Text Book followed	HOD Sign Weekly
1.	Bridge Course	2 Weeks	10-08-2026 TO 29-08-2026		TLM1	CO1		
2.	Introduction to the course				TLM2	CO1		
3.	Course Outcomes, Program Outcomes				TLM2	CO1		

UNIT-I:

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.	Effective Communication: Exploring Channels and Methods	01		31-08-26	TLM1 TLM2 TLM 6	CO1	T1,T2	
2.	Vocabulary: Roots, Prefixes & Suffixes	01		01-09-26	TLM2 TLM5	CO1	T1,T2	
3.	Homonyms	01		03-09-26	TLM1 TLM2 TLM5	CO1	T1,T2	
4.	Grammar: Articles	01		07-09-26	TLM1 TLM2 TLM5 TLM6	CO1	T1,T2	
5.	Grammar: Prepositions	01		08-09-26	TLM1 TLM2 TLM5 TLM6	CO1	T1,T2	
6.	Grammar: Tenses	01		09-09-26	TLM1 TLM2 TLM5 TLM6	CO1	T1,T2	
7.	Reading: Definition and Importance, Skills and Sub-Skills of Reading	01		15-09-26	TLM2 TLM5 TLM6	CO1	T1,T2	
8.	Writing :Cohesion and Coherence, Paragraph Writing.	01		16-09-26	TLM1 TLM2 TLM6	CO1	T1,T2	
9.	Listening : Listening for main ideas and supporting details,	01		21-09-26	TLM2 TLM5 TLM6	CO1	T1,T2	

	Note-taking							
10.	Speaking: Introducing self and others, Describing people and objects, JAM.	01		22-09-26	TLM4 TLM6	CO1	T1,T2	
No. of classes required to complete UNIT-I: 10						**No. of classes taken:**		

UNIT-II:

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.	Eco-Consciousness: Negotiating for a Sustainable Future	01		23-09-26	TLM1 TLM2 TLM 6	CO2	T1,T2	
2.	Vocabulary: Contractions & Phrasal Verbs	01		28-09-26	TLM2 TLM5	CO2	T1,T2	
3.	Vocabulary: Idioms & Phrases	01		29-09-26	TLM2 TLM5	CO2	T1,T2	
4.	Grammar: Subject-Verb Agreement	01		30-09-26	TLM1 TLM2 TLM5 TLM6	CO2	T1,T2	
5.	Grammar:Conditional Sentences	01		05-10-26	TLM1 TLM2 TLM5 TLM6	CO2	T1,T2	
6.	Reading: Reading for Inference, Point of View, Tone and Perspective.	01		06-10-26	TLM2 TLM5 TLM6	CO2	T1,T2	
7.	Writing : Note making, Summarizing, Paraphrasing.	01		07-10-26	TLM1 TLM2 TLM6	CO2	T1,T2	
8.	Listening : Listening to various texts and comprehension	01		08-10-26	TLM2 TLM5 TLM6	CO2	T1,T2	
9.	Speaking: Role-plays, Extempore.	01		12-10-26	TLM4 TLM6	CO2	T1,T2	
No. of classes required to complete UNIT-II: 09						**No. of classes taken:**		

UNIT-III:

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.	Disruptive Technologies: Ethical Implications and Future Prospects	01		13-10-26	TLM1 TLM2 TLM 6	CO3	T1,T2	
2.	Vocabulary: One-Word Substitutes	01		14-10-26	TLM2 TLM5	CO3	T1,T2	
3.	Vocabulary: Commonly Confused Words	01		26-10-26	TLM2 TLM5	CO3	T1,T2	
4.	Grammar: Degrees of Comparison	01		27-10-26	TLM1 TLM2 TLM5 TLM6	CO3	T1,T2	
5.	Grammar: Active and Passive Voice & Question Tags.	01		28-10-26	TLM1 TLM2 TLM5 TLM6	CO3	T1,T2	
6.	Reading: Reading the extracts/articles/ essays of the News Papers, Journals and literary texts.	01		02-11-26	TLM2 TLM5 TLM6	CO3	T1,T2	
7.	Writing : Paraphrasing, Letter Writing	01		03-11-26	TLM1 TLM2 TLM6	CO3	T1,T2	
8.	Listening : Listening to stories, news, documentaries and discussions.	01		04-11-26	TLM2 TLM5 TLM6	CO3	T1,T2	
9.	Speaking: Debate, Group Discussions	01		09-11-26	TLM4 TLM6	CO3	T1,T2	
No. of classes required to complete UNIT-III: 09						**No. of classes taken:**		

UNIT-IV:

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.	**Entrepreneurship and Start-Up Culture: Emerging Trends**	01		10-11-26	TLM1 TLM2 TLM 6	CO4	T1,T2	
2.	Vocabulary: Business/ Profession/ Career/ Job-related Vocabulary.	01		11-11-26	TLM2 TLM5	CO4	T1,T2	
3.	Grammar: Sentence Synthesis	01		16-11-26	TLM1 TLM2 TLM5 TLM6	CO4	T1,T2	

4.	Grammar: Simple, Compound and Complex Sentences.	01		17-11-26	TLM1 TLM2 TLM5 TLM6	CO4	T1,T2	
5.	Reading: Reading various texts for global understanding	01		18-11-26	TLM2 TLM5 TLM6	CO4	T1,T2	
6.	Writing : Email Writing	01		23-11-26	TLM1 TLM2 TLM6	CO4	T1,T2	
7.	Writing :Data Interpretation	01		24-11-26	TLM1 TLM2 TLM6	CO4	T1,T2	
8.	Writing : Report Writing	01		25-11-26	TLM1 TLM2 TLM6	CO4	T1,T2	
9.	Listening : Listening to debates and discussions.	01		30-11-26	TLM2 TLM5 TLM6	CO4	T1,T2	
10.	Speaking: Power Point Presentations by Individuals and Teams.	01		01-12-26	TLM4 TLM6	CO4	T1,T2	
No. of classes required to complete UNIT-IV: 10						**No. of classes taken:**		

UNIT-V:

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.	Ethical Leadership: Integrating Social Responsibility and Core Values	01		02-12-26	TLM1 TLM2 TLM 6	CO5	T1,T2	
2.	Vocabulary: Advanced Vocabulary for GRE/TOEFL/ IELTS/CAT etc.	01		07-12-26	TLM2 TLM5	CO5	T1,T2	
3.	Vocabulary: Advanced Vocabulary for GRE/TOEFL/ IELTS/CAT etc.	01		08-12-26	TLM2 TLM5	CO5	T1,T2	
4.	Grammar: Sentence Synthesis, Para Jumbles.	01		09-12-26	TLM1 TLM2 TLM5 TLM6	CO5	T1,T2	
5.	Grammar: Para Jumbles.	01		14-12-26	TLM1 TLM2 TLM5 TLM6	CO5	T1,T2	
6.	Reading: Reading texts for global comprehension.	01		15-12-26	TLM2 TLM5	CO5	T1,T2	

					TLM6			
7.	Writing : Book/Film Reviews	01		16-12-26	TLM1 TLM2 TLM6	CO5	T1,T2	
8.	Writing : Social Media Etiquette	01		21-12-26	TLM1 TLM2 TLM6	CO5	T1,T2	
9.	Listening : Listening to the talks/speeches by the eminent personalities	01		22-12-26	TLM2 TLM5 TLM6	CO5	T1,T2	
10.	Speaking: Team Discussions and Presentations	01		23-12-26	TLM4 TLM6	CO5	T1,T2	
No. of classes required to complete UNIT-V: 10						**No. of classes taken:**		

S. No.	Topics to be covered beyond the syllabus	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	**Word Analogy**	01		22-12-26	TLM2 , 5&6	
2.	**Critical & Logical Reasoning**	01		23-12-26	TLM2 , 5&6	
No. of classes required to complete UNIT-V:				**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 (R26 Regulation):

Evaluation Task	**Marks**
I – Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus)	M1=25
II – Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=25
Five quiz tests **(one for each unit)** (comprising of 10 / 05 short answer questions of one / two marks each respectively) / assignments / presentation / case studies / mini project	M3=50
Internal Marks (M)=M1+M2+M3	M=100
Cumulative Internal Examination (CIE): 40%(M)	40
Semester End Examination (SEE)	60
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization to develop to the solution of complex engineering problems.
PO 2	**Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.
PO 3	**Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required.
PO 4	**Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions.
PO 5	**Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems.
PO 6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment.
PO 7	**Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws.
PO 8	**Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO 9	**Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO 10	**Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO 11	**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

Title	Course Instructor	Course Coordinator	Module Coordinator	H o D
Name of the Faculty	Mr.B. Sreenivasa Reddy	Dr.B. Samrajya Lakshmi	Dr.B. Samrajya Lakshmi	Dr. T. Satyanarayana
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC with "A" Grade & NBA for ASE, CE, CSE, ECE, EEE, ME & IT (Under Tier - I)
An ISO 21001:2018, 14001:2015 and 50001:2018 Certified Institution
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L.B. Reddy Nagar, Mylavaram-521 230, NTR Dist., Andhra Pradesh
Phone: 08659-222933, Fax: 08659-222931
FRESHMAN ENGINEERING DEPARTMENT
Web.: https://lbrce.ac.in/fed/index.php Email: hodfed@lbrce.ac.in Ext.: 516

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. B. Sreenivasa Reddy

Course Name & Code : **English For Technical Communication & MOODLE Lab; A2610012**

L-T-P Structure : **0-0-03** **Credits** : 1.5

Program/Sem/Sec : B. Tech, I Sem , **A S E** **A.Y.** : 2026-27

Prerequisite : **NIL**

Course Educational Objectives :

- Develop active listening skills and the traits of an effective listener using lab activities and AI-based listening tools.
- Develop speaking and presentation skills through structured practice and AI-speech coaching tools.
- Apply reading techniques and Analyze the texts to strengthen comprehension and employability.
- Apply writing techniques for technical and professional letters, emails, resumes and report writing to enhance employability.

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

CO1	Apply a variety of strategies to interpret and comprehend spoken texts/ discourse using contextual clues.	K3
CO2	Apply appropriate speaking strategies to interpret content/material related to engineering and technology domain.	K3
CO3	Participate in discussions and presentations on general and technical topics.	K3
CO4	Possess an ability to write clearly on topics related to technology and workplace communication.	K3
CO5	Choose functional language, cohesive devices and skills of organization to express clearly in speaking.	K3
CO6	Demonstrate proficiency in using Moodle LMS and digital learning tools to access learning resources, manage academic activities, submit assignments, participate in quizzes and discussions,	K3
CO7	Apply digital communication, academic, research, and presentation skills while demonstrating academic integrity, responsible use of AI and digital technologies, and professional online behaviour.	K3

COURSE ARTICULATION MATRIX (Correlation between COs & POs)

COs\POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	–	2	–	–	1	2	–	2	2	3	–
CO2	1	3	–	2	2	2	–	–	–	2	2
CO3	–	2	–	–	2	2	–	3	3	3	2
CO4	–	2	–	–	2	2	–	2	2	3	2
CO5	–	2	–	–	1	2	–	3	3	3	2
CO6	–	2	–	–	3	2	–	2	2	2	3
CO7	–	2	1	2	3	2	2	3	3	3	3

1 = Slight (Low) **2= Moderate (Medium)** **3 = Substantial (High)**

List of Experiments :

1. **Phonetics & Accent Neutralization**

- Sound Lab Drills — Students record minimal pairs (/p/–/b/, /t/–/d/) and compare wave forms using free apps like Voice Recorder.
- Pronunciation Clinics — Peer-correction circles where each student reads a short passage focusing on stress and intonation.
- IPA Treasure Hunt — Give IPA transcriptions; students identify the words and pronounce them.
- Shadowing Practice — Students mimic short clips (newsreader, documentary narrator) to reduce mother-tongue influence.

2. **Introducing Self and Others**

- Speed Networking — Students rotate every 2 minutes and introduce themselves to a new partner.
- Identity Cards — Each student prepares a "professional identity card" and introduces another student using it.
- Role-based Introductions — introduce yourself as a student, intern, job applicant, club member, etc.

3. **Brief Talk in Formal/Informal Contexts, JAM/Extempore**

- JAM Box — A box with random topics; students pick one and speak for 60 seconds.
- Context Switch — Students speak on the same topic twice: once formally (seminar), once informally (friends).
- Prompt Cards — Situational prompts: "Convince your friend to join a club", "Address a class meeting".

4. **Listening Comprehension**

- Audio Quizzes — Play short clips (announcements, interviews) and ask MCQs.
- Gap-fill Listening — Provide partially blank transcripts; students fill missing words.
- Error Spotting — Students listen to a narration and identify factual inconsistencies.

5. **Process Description & Paragraph Writing (Technical Lab Context)**
   - Lab-to-Paragraph — After a lab experiment, students write a process description using sequence markers.
   - Flowchart to Paragraph — Provide a technical flowchart; students convert it into a coherent paragraph.
   - Reverse Engineering — Give a paragraph; students convert it back into steps and check accuracy.

6. **Group Discussions & Deliberations – Coming to Consensus**

   - Consensus Challenge — Groups must agree on one solution to a problem (e.g., "Best way to reduce campus waste").
   - Fishbowl GD — Inner circle discusses; outer circle observes and gives feedback.
   - Ranking Task — Groups rank items (e.g., skills for employability) and justify their consensus.

7. **Micro Presentations (2–5 minutes)**
   - One-Slide Presentation — Students prepare a single slide and speak for 3 minutes.
   - Teach a Concept — Students explain a simple technical idea (e.g., "How Wi-Fi works").
   - Object Talk — Students bring an object and present its use, history, or mechanism.

8. **Presenting Logical Arguments – Debates**
   - Two-Minute Debates — Quick debates with timed arguments and rebuttals.
   - Evidence Hunt — Students gather data or examples to support their stance before debating.
   - Role-based Debates — Students debate from assigned roles (environmentalist, policymaker, student).

9. **Talking About Social Issues & Data Interpretation**
   - Data Talk — Provide charts/graphs (literacy rates, pollution levels); students interpret and present insights.
   - Issue Circles — Groups discuss a social issue and propose one actionable solution.
   - Poster-to-Speech — Students convert an infographic into a 2-minute talk.

10. **Interviews – Formal & Semi-formal**
   - Mock Interview Panels — Students face a panel of peers acting as interviewers.
   - Resume-based Q&A — Students ask each other questions based on their resumes.
   - Situational Interviews — Semi-formal scenarios: club membership, internship, volunteer role.

Lab Manual

- Propel: A Course Book for Technical English Communication. Cengage Publishers, 2026.

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma.TechnicalCommunication.OxfordPress.2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw Hill Education India,2016.
3. Hewing's, Martin. Cambridge Academic English (B2).CUP, 2012.
4. J.Sethi & P.V.Dhamija. A Course in Phonetics and Spoken English, (2ndEd), Kindle, 2013
5. Richards, Jack C., Jonathan Hull, and Susan Proctor. Interchange Level 3 Student's Book with Self-study DVD-ROM. Vol. 3. Cambridge University Press, 2012.

Web Resources:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw
12. https://www.youtube.com/user/letstalkaccent/videos
13. https://www.youtube.com/c/EngLanguageClub/featured
14. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
15. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

Part B

Moodle Learning Management System: Digital learning and Academic Skills Course Objectives

- To become familiar with model LMS and on-line learning
- To develop basic Digital and Academic Skills needed for Engineering students
- To learn effective on-line communication and collaboration
- To develop skills in Assignments, Quizzes, Presentation and Refreshing
- To practice Academic Integrity and Responsible use of Digital Technology

Moodle Learning Management System: Digital learning to enhance Academic Skills. Students familiarize with model LMS and on-line learning, communication and collaboration. They develop skills in Assignments, Quizzes, Presentation and online interviews. They exercise academic Integrity and responsible use of Digital Technology. They adopt the usage of Grammarly, ChatGPT, Culture Wizard, Quizlet AI and Google Speech – to-text to enhance their respective skills.

List of Experiments

1. **Introduction to Moodle LMS**
   - Introduction to Moodle
   - Student login and profile management
   - Moodle dashboard and course navigation
   - Accessing announcements and course materials
   - Notifications and calendars
2. **Learning Through Moodle**
   - Accessing PDFs, videos, web resources, and lecture materials
   - Downloading and organizing study materials
   - Moodle lessons and learning activities
   - Tracking course completion
   - Managing deadlines and study schedules
3. **Assignments, Quizzes and Assessments**
   - Understanding assignment instructions
   - Creating and uploading assignments
   - File formats and file naming
   - Online quizzes and question types
   - Viewing marks and teacher feedback
   - Re-submission and revision

4. **Academic honesty**
   - Plagiarism and how to avoid it
   - Copyright and fair use
   - Responsible use of AI tools
   - Digital privacy and cyber security
   - Evaluating reliable online information
   - Professional behavior in online environments
   - Practical Activities

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Part - A

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Complétion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	**Phonetics & Accent Neutralisation**	03		31-08-26	TLM2 TLM4 TLM5	
2.	**Introducing Self and Others**	03		07-09-26	TLM4 TLM5 TLM6	
3.	**Brief Talk in Formal/ Informal Contexts, JAM/Extempore**	03		21-09-26	TLM4 TLM1	
4.	**Listening Comprehension**	03		28-09-26	TLM1 TLM5 TLM6	
5.	**Process Description & Paragraph Writing (Technical Lab Context)**	03		05-10-26	TLM1 TLM3 TLM5 TLM6	
6.	**Group Discussions**	03		12-10-26	TLM3 TLM6	
7.	**Micro Presentations (2–5 minutes)**	03		26-10-26	TLM4 TLM5 TLM6	
8.	**Presenting Logical Arguments – Debates**	03		02-11-26	TLM4 TLM5 TLM6	
9.	**Talking About Social Issues & Data Interpretation**	03		09-11-26	TLM4 TLM5 TLM6	
10.	**Interviews – Formal & Semi-formal**	03		16-11-26	TLM3 TLM4 TLM5 TLM6	
				No. of classes required to complete Part - A :		**30**

Part - B (MOODLE)

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 Moodle LMS**	03		23-11-26	TLM4 TLM5	
2.	**Learning Through Moodle -** Accessing PDFs, videos, web resources, and lecture materials	03		30-11-26	TLM4 TLM5	
3.	**Assignments, Quizzes and Assessments -** Creating and uploading assignments	03		07-12-26	TLM4 TLM5	
4.	**Academic honesty -** Plagiarism and how to avoid it	03		14-12-26	TLM4 TLM5	
No. of classes required to complete Part - B :						**12**

S. No.	Topics to be covered beyond the syllabus	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Oxford online Grammar Test	03		**21-12-26**	TLM4 TLM5	
No. of classes required to complete : 03				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	**Marks**
For Every Experiment_ Day-to-Day Work	A1 = 5
For Every Experiment_ Viva-voce & record	B1 = 5
Evaluated for best 10 experiments C1= 10X(A1+B1)	C1=100
Cumulative Internal Examination (CIE): 50%(C1)	50
Semester End Examination (SEE)	50
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization to develop to the solution of complex engineering problems.
PO 2	**Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.
PO 3	**Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required.
PO 4	**Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions.
PO 5	**Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems.
PO 6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment.
PO 7	**Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws.
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PO 10	**Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO 11	**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

Title	Course Instructor	Course Coordinator	Module Coordinator	H o D
Name of the Faculty	Mr. B. Sreenivasa Reddy	Dr.B. Samrajya Lakshmi	Dr.B. Samrajya Lakshmi	Dr. T. Satyanarayana
Signature				