LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, (AUTONOMOUS)

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

COURSE HANDOUT

PART-A

Name of Course Instructor : B. Sreenivasa Reddy
Course Name & Code : Communicative English & 23FE01
L-T-P Structure : 2-0-0   **Credits:** 02
Program/Sem/Sec : B. Tech, I Sem – MECH
A.Y. : 2023-24

PREREQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The main objective of introducing this course, *Communicative English,* is to facilitate effective Listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

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

CO1	Understand the context, topic, and pieces of specific information from social or Transactional dialogues.	L2
CO2	Apply grammatical structures to formulate sentences and correct word forms.	L3
CO3	Use discourse markers to speak clearly on a specific topic in informal discussions.	L3
CO4	Read / Listen the texts and write summaries based on global comprehension of these texts.	L2
CO5	Prepare a coherent paragraph, essay, and resume.	L3

COURSE ARTICULATION MATRIX (Correlation between COs & POs)

Course Outcomes PO's →	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1.	-	-	-	1	-	-	-	-	3	3	-	2
CO2.	-	-	-	1	-	-	-	-	3	3	-	2
CO3.	-	-	-	1	-	-	-	-	3	3	-	2
CO4.	-	-	-	1	-	-	-	-	3	3	-	2
CO5.	-	-	-	1	-	-	-	-	3	3	-	2
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 Outcome COs	Text Book followed	HOD Sign Weekly
1.	Bridge Course				TLM1			
2.	Introduction to the course	3 Weeks	31-08-2023 TO 16-09-2023		TLM1			
3.	Course Outcomes, Program Outcomes				TLM2			

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.	Human Values: Gift of Magi	02	19-09-23 21-09-23		TLM1 TLM 6	CO1	T1,T2	
2.	Skimming to get main idea; Scanning for specific pieces of information	01	25-09-23		TLM2 TLM5	CO1	T1,T2	
3.	Mechanics of Writing: Capitalization, Spelling, Punctuation & Parts of Sentences	01	26-09-23		TLM1 TLM6 TLM5	CO1	T1,T2	
4.	Parts of speech	02	03-10-23 05-10-23		TLM2 TLM6	CO1	T1,T2	
5.	Basic Sentence Structures, Forming questions	01	09-10-23		TLM2 TLM6	CO1	T1,T2	
6.	Synonyms, Antonyms	01	10-10-23		TLM2 TLM5	CO1	T1,T2	
7.	Affixes, Root Words	01	12-10-23		TLM2 TLM5	CO1	T1,T2	
No. of classes required to complete UNIT-I: 09						**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
8.	Nature: The Brook by Alfred Tennyson	03	16-10-23 17-10-23 19-10-23		TLM1 TLM 6	CO2	T1,T2	
9.	Identifying Sequence of ideas, Linking ideas into a Paragraph	02	26-10-23 30-10-23		TLM2 TLM5	CO2	T1,T2	
10.	Structure of Paragraph – Paragraph Writing	02	31-10-23 02-11-23		TLM1 TLM6 TLM5	CO2	T1,T2	
11.	Cohesive Devices-linkers	01	13-11-23		TLM2 TLM6	CO2	T1,T2	
12.	Use of Articles and zero article, Prepositions	02	06-11-23 07-11-23		TLM2 TLM6	CO2	T1,T2	
13.	Homophones, Homographs, Homonyms	01	09-11-23		TLM2 TLM5	CO2	T1,T2	
No. of classes required to complete UNIT-II: 11			**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
14.	Biography: Elon Musk	02	14-11-23 16-11-23		TLM1 TLM 6	CO3	T1,T2	
15.	Reading and making basic inferences – recognizing and interpreting the text clues for comprehension	01	20-11-23		TLM2 TLM5	CO3	T1,T2	
16.	Summarizing, Note-making, Paraphrasing	01	21-11-23		TLM1 TLM6 TLM5	CO3	T1,T2	
17.	Verbs- Tenses, Subject-verb agreement	02	23-11-23 27-11-23		TLM2 TLM6	CO3	T1,T2	
18.	Compound words, Collocations	01	28-11-23		TLM2 TLM5	CO3	T1,T2	
No. of classes required to complete UNIT-III: 07						**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
19.	Inspiration: The Toys of Peace- by Saki	02	30-11-23 04-12-23		TLM1 TLM 6	CO4	T1,T2	
20.	Study of graphic elements in text to display complicated data	02	05-12-23 07-12-23		TLM2 TLM5	CO4	T1,T2	
21.	Letter Writing : Official Letters, Resumes	03	11-12-23 12-12-23 14-12-23		TLM1 TLM6 TLM5	CO4	T1,T2	
22.	Reporting verbs, Direct & Indirect Speech, Active & Passive voice	02	18-12-23 19-12-23		TLM2 TLM6	CO4	T1,T2	
23.	Words often confused, Jargons	02	21-12-23 26-12-23		TLM2 TLM5	CO4	T1,T2	
No. of classes required to complete UNIT-IV: 11						**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
24.	Motivation: The Power of Interpersonal Communication	02	28-12-23 02-01-24		TLM1 TLM 6	CO5	T1,T2	
25.	Reading Comprehension	01	04-01-24		TLM2 TLM5	CO5	T1,T2	
26.	Structured Essays on specific topics	01	08-01-24		TLM1 TLM6 TLM5	CO5	T1,T2	
27.	Editing Texts – Correcting Common errors	01	09-01-24		TLM2 TLM6	CO5	T1,T2	
28.	Technical Jargon	01	11-01-24		TLM2	CO5	T1,T2	

					TLM5			
No. of classes required to complete UNIT-V: 06							**No. of classes taken:**		

Content beyond the Syllabus

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	11-01-2024		TLM2 &5	
No. of classes required to complete				**No. of classes taken:**		

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

PART-C
EVALUATION PROCESS (R23 Regulation):

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

PROGRAMME OUTCOMES (POs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	B. Sreenivasa Reddy	Dr. R. Padma	Dr.A. Ramireddy	Dr. A. Ramireddy
Signature				

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

PROGRAM	: **B.Tech., I-Sem., ME-A**
ACADEMIC YEAR	: **2023-24**
COURSE NAME & CODE	: **ENGINEERING PHYSICS**
L-T-P STRUCTURE	: **3-1-0**
COURSE CREDITS	: **3**
COURSE INSTRUCTOR	: **Dr.N.Aruna**
PRE-REQUISITE	: **Nil**

COURSE EDUCATIONAL OBJECTIVES (CEOs): To bring the gap between the physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction, etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and maganetic materials, physics of semiconductors.

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

CO 1	**Analyze** the intensity of variation of light due to interference, diffraction and polarization (L3)
CO 2	**Understand** the basics of crystals and their structures (L2)
CO 3	**Summarize** various types of polarization of dielectrics and classify the magnetic materials(L2
CO 4	**Explain** the fundamentals of quantum mechanics and free electron theory of metals(L2)
CO5	**Identify** the type of semiconductor using Hall Effect (L3)

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

ENGINEERING PHYSICS												
COURSE DESIGNED BY	**FRESHMAN ENGINEERING DEPARTMENT**											
Course Outcomes	**Programme Outcomes**											
PO's →	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1.	3	3	2	1	1	1	1	-	-	-	-	1
CO2.	3	3	2	1	1	1	1	-	-	-	-	1
CO3.	3	3	2	1	1	1		-	-	-	-	1
CO4.	3	3	2	1	1	1	1	-	-	-	-	1
CO5.	3	3	2	1	1	1	1	-	-	-	-	1
1 = slight (Low)			**2 = Moderate (Medium)**				**3 = Substantial (High)**					

BOS APPROVED TEXT BOOKS:

T1 : V. Rajendran, "*Engineering Physics*", TMH, New Delhi, 6th Edition, 2014.
T2 :M.N. Avadhanulu, P.G. Kshirsagar, "Engineering *Physics*", S. Chand &Co.,
2nd Edition, 2014.

BOS APPROVED REFERENCE BOOKS:

R1: M.N. Avadhanulu, TVS Arun Murthy, "Applied *Physics*", S. Chand & Co., 2nd
Edition, 2007.
R2 :P.K. PalaniSamy, "*Applied Physics*", Sci. Publ. Chennai, 4th Edition, 2016.
R3 :P. SreenivasaRao, K Muralidhar, "*Applied Physics*", Him. Publi. Mumbai,1st
Edition, 2016.
R4 :Hitendra K Mallik , AK Singh " *Engineering Physics*", TMH, New Delhi, 1st
Edition, 2009.

WEB REFERENCES AND E-TEXT BOOKS

1. http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html

2. http://physicsdatabase.com/free-physics-books/

3. http://www.e-booksdirectory.com

4. http://www.thphys.physics.ox.ac.uk

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

PART-B

COURSE HANDOUT (LESSON PLAN):

UNIT-I: WAVE OPTICS

Course Outcome :- CO 1; Text Book :- T1, R2

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign	Remarks
1.	Introduction to the Subject, Course Outcomes	1	19/09/2023		**TLM2**		
2.	Superposition of waves, Coherence, Conditions for Interference	1	20/092023		**TLM1**		
3.	Interference from thin films, colours in thin films	1	22/09/2023		**TLM1**		
4.	Newton's rings	1	25/092023		**TLM4**		

5.	TUTORIAL-1	1	26/09/2023		**TLM3**		
6.	Introduction – Diffraction, Types	1	27/092023		**TLM2**		
7.	Single slit diffraction	1	29/09/2023		**TLM4**		
8.	Double slit	1	03/10/2023		**TLM4**		
9.	N Slits Diffraction grating	1	04/10/2023		**TLM4**		
10.	TUTORIAL-2	1	06/10/2023		**TLM3**		
11.	Dispersive power &Resolving power of Grating	1	09/10/2023		**TLM1**		
12.	Polarization introduction , types	1	10/10/2023		**TLM1**		
13.	Polarization by reflection, refraction	1	11/10/2023		**TLM2**		
14.	Double refraction, Nicol's prism	1	13/10/2023		**TLM2**		
15.	Half wave and quarter wave plate	1	16/10/2023		**TLM2**		
No. of classes required to complete UNIT-I: 15				No. of classes taken:			

UNIT-II: CRYSTALLOGRAPHY AND X RAY DIFFRACTION

Course Outcome :- CO 2; Text Book :- T1, R2

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign	Remarks
1.	Crystallography Basic defnitions	1	17/10/2023		**TLM2**		
2.	Bravais Lattices	1	18/10/2023		**TLM1**		
3.	Crystal Systems	1	20/10/2023		**TLM1**		
4.	Packing fraction of SC, BCC	1	25/10/2023		**TLM2**		
5.	FCC	1	27/10/2023		**TLM2**		
6.	Tutorial -2		30/10/2023		**TLM3**		
7.	Miller Indices, separation between (hkl) planes	1	31/10/2023		**TLM2**		
8.	Bragg's law	1	01/11/2023		**TLM1**		
9.	X-ray Diffractometer	1	03/11/2023		**TLM1**		
10.	Laue's method	1	06/11/2023		**TLM2**		
11.					**TLM1**		
12.	powder method		07/11/2023		**TLM2**		
13.	problems		08/11/2023		**TLM3**		
14.	Assignment		10/11/2023		**TLM3**		
No. of classes required to complete UNIT-II: 14				No. of classes taken:			

UNIT-III: DIELECTRIC AND MAGNETIC MATERIALS

Course Outcome :- CO 3; Text Book :- T1, R2

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign	Remarks
1.	Basic Definitions Relation between electric vectors	1	20/11/2023		**TLM1**		
2.	Electronic polarization	1	21/11/2023		**TLM1**		
3.	Ionic & Orientation polarization	1	22/11/2023		**TLM1**		
4.	Local field,	1	24/11/2023		**TLM1**		
5	ClausiusMosotti equation, complex dielectric constant	1	27/11/2023		**TLM2**		
6	Frequency dependence of polarization Dielectric loss and problems	1	28/11/2023		**TLM1**		
7	Introduction to Magnetic parameters origin of magnetic moment	1	29/11/2023		**TLM1**		
8	Classification of magnetic materials – Dia, para& Ferro	1	01/12/2023		**TLM1**		
9	Classification of magnetic materials – Dia, para& Ferro Anti ferro and ferri	1	04/12/2023		**TLM2**		
10	Domain concept of ferromagnetism and domain walls	1	05/12/2023		**TLM2**		
11	Hysteresis curve soft and hard magnetic materials	1	06/12/2023		**TLM1**		
No. of classes required to complete UNIT-II: 11			No. of classes taken:				

UNIT-IV QUANTUM MECHANICS & FREE ELECTRON THEORY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign	Remarks
1.	Introduction quantum mechanics,De Broglie hypothesis	1	08/12/2023		TLM1		
2.	Heisenberg uncertainty principle	1	11/12/2023		TLM1		
3.	Physical significance of wave function Schrodinger time dependent & independent wave equations	1	12/12/2023		TLM1		
4.	Particle in a box	1	13/12/2023		TLM2		
5.	Problems &Assignment/Quiz	1	15/12/2023		TLM1		
6.	Classical free electron theory-postulates, Success & Failures	**1**	18/12/2023		**TLM2**		
7.	Quantum free electron theory	**1**	19/12/2023		**TLM2**		
8.	electrical conductivity	**1**	20/12/2023		**TLM2**		
9.	Fermi-Dirac distribution function-Temperature dependence	**1**	22/12/2023		**TLM2**		
10.	Density of states Fermi energy	1	26/12/2023		**TLM2**		
No. of classes required to complete UNIT-III: 17			No. of classes taken:				

UNIT-IV :SEMICONDUCTOR PHYSICS

Course Outcome :- CO 4; Text Book :- T2, R1

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign	Remarks
1.	Introduction - Classification of semiconductors	1	27/12/2023		TLM1		
2.	Density of Intrinsic and semiconductors	1	29/12/2023		TLM1		

3.	Electrical conductivity and fermi level	1	02/01/2024		**TLM1**		
4.	Density of Extrinsic semiconductors	1	03/01/2024		**TLM2**		
5.	Dependence of fermi energy on carrier concentration and fermi energy	1	05/01/2024		**TLM2**		
6.	Einstein equation Drift and diffusion currents	1	08/01/2024		**TLM1**		
7.	Hall effect and applications	1	09/01/2024		**TLM2**		
8.	Revision	1	10/01/2024		**TLM2**		
9.	Revision	1	12/01/2024		**TLM2**		
No. of classes required to complete UNIT-IV: 9				No. of classes taken:			

PART-C

EVALUATION PROCESS (R-20 Regulation):

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I, II)	M-1=18
I-Quiz Examination (Units-I, II)	Q1=07
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III , IV & V)	M-2=18
II-Quiz Examination (Units-III, IV & V)	Q2=07
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M-1,M-2)+25% of Min(M-1,M-2)	M=18
Quiz Marks =75% of Max(Q-1,Q-2)+25% of Min(Q-1,Q-2)	Q=07
Cumulative Internal Examination (CIE): A+M+Q	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	**100**

PART-D

PROGRAMME OUTCOMES (POs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.N.Aruna	**Dr. S. Yusub**	**Dr. S. Yusub**	**Dr. A. Rami Reddy**

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FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT
Part-A

PROGRAM : I B. Tech., I-Sem., MECH
ACADEMIC YEAR : 2023-24
COURSE NAME & CODE : Linear Algebra & Calculus
L-T-P STRUCTURE : 3-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Dr. Y. P. C. S. Anil Kumar
COURSE COORDINATOR : Dr. A. Rami Reddy
PRE-REQUISITES : Basics of Matrices, Differentiation, Integration

COURSE EDUCATIONAL OBJECTIVES (CEOs): To equip the students with standard concepts and tools at an intermediate to advanced level mathematics, to develop the confidence and ability among the students to handle various real-world problems and their applications.

COURSE OUTCOMES (COs)

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

CO1: Apply matrix algebra techniques to solve engineering problems – **L3**

CO2: Use Eigen values and Eigen vectors conceptto find nature of quadratic form, inverse and powers of matrix – **L3**

CO3: Expand various functions using Mean value theorems – **L2**

CO4: Understand the concepts of functions of several variables which are useful in optimization – **L2**

CO5: Evaluate areas and volumes by using double and triple integrals – **L3**

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

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

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

BOS APPROVED TEXT BOOKS:

T1 Dr. B.S. Grewal, "Higher Engineering Mathematics", 44ndEdition, Khanna Publishers, New Delhi, 2017.

T2 Erwin Kreyszig, *"Advanced Engineering Mathematics"*, 10th Edition, John Wiley & sons, New Delhi, 2018.

BOS APPROVED REFERENCE BOOKS:

R1 George B. Thomas, Maurice D. Weir and Joel Hass, "*Thomas Calculus*", 14th Edition, Pearson Publishers, 2018.

R2 R.K. Jain and S.R.K. Iyengar, "*Advanced Engineering Mathematics*", 5th Edition (9th reprint), Alpha Science International Ltd., 2021.

R3 Glyn James, "*Advanced Modern Engineering Mathematics*", 5th Edition, Pearson Publishers, 2018.

R4 Michael D.Greenberg, "*Advanced Engineering Mathematics*", 9th Edition, Pearson Publishers.

R5 H.K. Das, Er. Rajnish Verma, "*Higher Engineering Mathematics*", 3rd Edition(Reprint 2021), S. Chand Publications, 2014.

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	08-09-2023 to 16-09-2023	08-09-2023 to 16-09-2023	TLM1			
2.	Introduction to the course	1	20-09-2023		TLM2			
3.	Course Outcomes, Program Outcomes	1	20-09-2023		TLM2			

UNIT-I: Matrices

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	21-09-2023		TLM1	CO1	T1,T2	
5.	Rank of a matrix	1	22-09-2023		TLM1	CO1	T1,T2	
6.	Echelon form	1	26-09-2023		TLM1	CO1	T1,T2	
7.	Normal form	1	27-09-2023		TLM1	CO1	T1,T2	
8.	Cauchy-Binet formulae	1	27-09-2023		TLM1	CO1	T1,T2	
9.	Inverse by Gauss-Jordan method	1	29-09-2023		TLM1	CO1	T1,T2	
10.	System of Linear Equations	1	03-10-2023		TLM1	CO1	T1,T2	
11.	Homogeneous System of Equations	1	04-10-2023		TLM1	CO1	T1,T2	
12.	Homogeneous System of Equations	1	04-10-2023		TLM1	CO1	T1,T2	
13.	Non-Homogeneous System of Equations	1	05-10-2023		TLM1	CO1	T1,T2	
14.	Gauss Elimination Method	1	06-10-2023		TLM1	CO1	T1,T2	
15.	Jacobi Iteration Method	1	10-10-2023		TLM1	CO1	T1,T2	
16.	Gauss-Seidel Method	1	11-10-2023		TLM1	CO1	T1,T2	
17.	**TUTORIAL 1**	1	11-10-2023		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-I		14				No. of classes taken:		

UNIT-II: Eigen Values, Eigen Vectors and Orthogonal Transformations

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
18.	Introduction to Unit II	1	12-10-2023		TLM1	CO2	T1,T2	
19.	Eigen values, Eigen vectors	1	13-10-2023		TLM1	CO2	T1,T2	
20.	Eigen values, Eigen vectors	1	17-10-2023		TLM1	CO2	T1,T2	
21.	Properties	1	18-10-2023		TLM1	CO2	T1,T2	
22.	Cayley-Hamilton Theorem	1	18-10-2023		TLM1	CO2	T1,T2	
23.	Finding Inverse and Powers of matrix	1	19-10-2023		TLM1	CO2	T1,T2	

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
24.	Diagonalization of a matrix	1	25-10-2023		TLM1	CO2	T1,T2	
25.	Quadratic Forms	2	25-10-2023 26-10-2023		TLM1	CO2	T1,T2	
26.	Nature of Quadratic Forms	1	*27-10-2023*		TLM1	CO2	T1,T2	
27.	Reduction of Quadratic form to Canonical form	1	31-10-2023		TLM1	CO2	T1,T2	
28.	Orthogonal Transformation	1	01-11-2023		TLM1	CO2	T1,T2	
29.	Orthogonal Transformation	1	01-11-2023		TLM1	CO2	T1,T2	
30.	**TUTORIAL 2**	1	02-11-2023		TLM3	CO2	T1,T2	
31.	Revision	1	03-11-2023					
No. of classes required to complete UNIT-II		15			No. of classes taken:			

I MID EXAMINATIONS (13-11-2023 TO 17-11-2023)

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	1	07-11-2023		TLM1	CO3	T1,T2	
33.	Mean Value theorem	1	08-11-2023		TLM1	CO3	T1,T2	
34.	Rolle's theorem	1	08-11-2023		TLM1	CO3	T1,T2	
35.	Lagrange's mean value theorem	1	09-11-2023		TLM1	CO3	T1,T2	
36.	Lagrange's mean value theorem	1	10-11-2023		TLM1	CO3	T1,T2	
37.	Cauchy's mean value theorem	1	21-11-2023		TLM1	CO3	T1,T2	
38.	Cauchy's mean value theorem	1	22-11-2023		TLM1	CO3	T1,T2	
39.	Taylor's theorem	1	22-11-2023		TLM1	CO3	T1,T2	
40.	Maclaurin's theorem	1	23-11-2023		TLM1	CO3	T1,T2	
41.	Problems and applications	1	24-11-2023		TLM1	CO3	T1,T2	
42.	**TUTORIAL 3**	1	28-11-2023		TLM3	CO3	T1,T2	
No. of classes required to complete UNIT-III		11			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
43.	Introduction to Unit IV, Functions of several variables.	1	29-11-2023		TLM1	CO4	T1,T2	
44.	Continuity and Differentiability	1	29-11-2023		TLM1	CO4	T1,T2	
45.	Partial Derivatives	1	30-11-2023		TLM1	CO4	T1,T2	
46.	Total derivatives, Chain rule, Directional Derivative	1	01-12-2023		TLM1	CO4	T1,T2	

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
47.	Taylor's Series expansion	1	05-12-2023		TLM1	CO4	T1,T2	
48.	Maclaurin's series expansion	1	06-12-2023		TLM1	CO4	T1,T2	
49.	Jacobian	1	06-12-2023		TLM1	CO4	T1,T2	
50.	Functional Dependence	1	07-12-2023		TLM1	CO4	T1,T2	
51.	Maxima and Minima	1	08-12-2023		TLM1	CO4	T1,T2	
52.	Lagrange Multiplier Method	1	12-12-2023		TLM1	CO4	T1,T2	
53.	**TUTORIAL 4**	1	13-12-2023		TLM3	CO4	T1,T2	
No. of classes required to complete UNIT-IV		11			No. of classes taken:			

UNIT-V: Multiple Integrals (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
54.	Introduction to Unit V	1	13-12-2023		TLM1	CO5	T1,T2	
55.	Double Integrals - Cartesian coordinates	1	14-12-2023		TLM1	CO5	T1,T2	
56.	Double Integrals- Polar co ordinates	1	15-12-2023		TLM1	CO5	T1,T2	
57.	Triple Integrals - Cartesian coordinates	1	19-12-2023		TLM1	CO5	T1,T2	
58.	Triple Integrals - Spherical coordinates	1	20-12-2023		TLM1	CO5	T1,T2	
59.	Change of order of Integration	1	20-12-2023		TLM1	CO5	T1,T2	
60.	Change of order of Integration	1	21-12-2023		TLM1	CO5	T1,T2	
61.	Change of variables	1	22-12-2023		TLM1	CO5	T1,T2	
62.	Finding area by double Integral	1	26-12-2023		TLM1	CO5	T1,T2	
63.	Finding Volume by double and triple Integral	2	27-12-2023 27-12-2023		TLM1	CO5	T1,T2	
64.	**TUTORIAL 5**	1	28-12-2023		TLM3	CO5	T1,T2	
No. of classes required to complete UNIT-V		12			No. of classes taken:			

Content beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
65.	Other applications of double integral	1	29-12-2023		TLM2	CO5	T1,T2	
No. of classes		1			No. of classes taken:			

II MID EXAMINATIONS (01-01-2024 TO 06-01-2024)

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

EVALUATION PROCESS (R20 Regulation):

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

PART-D
PROGRAMME OUTCOMES (POs):

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

Dr.Y.P.C.S.Anil Kumar	Dr. A. RAMI REDDY	Dr. A. RAMI REDDY	Dr. A. RAMI REDDY
Course Instructor	Course Coordinator	Module Coordinator	HoD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Course Name & Code	: BASIC MECHANICAL ENGINEERING & 23CM01
L-T-P Structure	: 3-0-0 **Credits:** 3
Program/Sem/Sec	: B.Tech/I/A **A.Y.:** 2023-24
Name of Course Coordinator	: Dr. Murahari Kolli
Name Of Course Instructor	: Dr. Murahari Kolli

Prerequisite Subject: Nil

Course Educational Objectives: The students after completing the course are expected to get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries. Explain different engineering materials and different manufacturing processes. Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

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

CO1	Summarize the different manufacturing processes. Remembering-L1)
CO2	Explain the basics of thermal engineering and its applications. (Understanding-L2)
CO3	Illustrate the working of different mechanical power transmission systems and power plants. (Understanding-L2)
CO4	Describe the basics of robotics and its applications. (Understanding-L2)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1											1	
CO2	1	1												1	
CO3	1	1												1	1
CO4	1	1												1	1

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

BOS APPROVED TEXT BOOKS:
- **T1** Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
- **T2** A text book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd
- **T3** An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd

BOS APPROVED REFERENCE BOOKS:

R1 G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.

R2 Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.

R3 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications.

R4 Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT-I: Introduction to Mechanical Engineering & Engineering Materials

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning OutcomeCOs	Text Book followed	HOD Sign Weekly
1.	Introduction to Introduction to Mechanical Engineering: - Course Educational Objective & Course Outcomes	01	20/9/2023		**TLM1**	CO1	T3,R6	
2.	Define Engineering, Role of Engineering.	01	22/9/2023		**TLM1**	CO1	T3,R6	
3.	Role of Mechanical Engineering in Industries and Society	01	23/9/2023		**TLM1**	CO1	T3	
4.	Technologies in different sectors such as Energy	01	25/9/2023		**TLM1**	CO1	T3	
5.	Technologies in different sectors such as Manufacturing	01	26/9/2023		**TLM1**	CO1	T3	
6.	Technologies in different sectors such as Automotive	01	27/9/2023		**TLM1**	CO1	T2,R1,R3	
7.	Technologies in different sectors such as Aerospace	01	29/9/2023		**TLM1**	CO1	T2,R1,R3	
8.	Technologies in different sectors such as Marine sectors	01	30/9/2023		**TLM1**	CO1	T3,R1	
9.	Engineering Materials	01	3/10/2023		**TLM1**	CO1	T2,R1	
10.	Metals-Ferrous and Non-ferrous,	01	4/10/2023		**TLM1**	CO1	T2,R1	
11.	Ceramics, Composites,	01	6/10/2023		**TLM1**	CO1	T2,R1	
12.	Smart materials	01	7/10/2023					
No. of classes required to complete UNIT-I		**12**			No. of classes taken:			
UNIT – II Manufacturing Processes &Thermal Engineering								
13.	Principles of Casting	01	9/10/2023		**TLM1**	CO2	T2,R1	
14.	Forming,	01	10/10/2023		**TLM1**	CO2	T2,R1	
15.	Joining processes,	01	11/10/2023		**TLM1**	CO2	T2,R1	
16.	Machining	01	13/10/2023		**TLM1**	CO2	T2,R1	
17.	Introduction to CNC machines	01	14/10/2023		**TLM1**	CO2	T2,R1	
18.	3D printing, and Smart manufacturing	01	16/10/2023		**TLM1**	CO2	T2,R1	
19.	Working principle of Boilers	01	17/10/2023		**TLM1**	CO2	T2,R1	
20.	Otto cycle, Diesel cycle	01	18/10/2023		**TLM1**	CO2	T2,R1	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning OutcomeCOs	Text Book followed	HOD Sign Weekly
21.	Refrigeration and air-conditioning cycles,	01	25/10/2023		**TLM1**	CO2	T2,R1	
22.	IC engines, 2-Stroke and 4-Stroke engines	01	27/10/2023		**TLM1**	CO2	T2,R1	
23.	SI/CI Engines	01	28/10/2023		**TLM1**	CO2	-	
24.	Components of Electric and Hybrid Vehicles.	01	30/10/2023		**TLM1**	CO2	-	
No. of classes required to complete UNIT-II		**12**			**No. of Classes taken:**			

UNIT-III: Power plants, Mechanical Power Transmission, Introduction to Robotics

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning OutcomeCOs	Text Book followed	HOD Sign Weekly
25.	Working principle of Steam	01	01/11/2023		**TLM1**	CO3	T2,R6	
26.	Diesel, Hydro	01	03/11/2023		**TLM1**	CO3	T2,R6	
27.	Nuclear power plants	01	04/11/2023		**TLM1**	CO3	T1,T2,R1	
28.	Belt Drives, Chain	01	06/11/2023		**TLM1**	CO3	T1,T2,R1	
29.	Rope drives,	01	07/11/2023		**TLM1**	CO3	-	
30.	Gear Drives and their applications.	01	08/11/2023		**TLM1**	CO3	-	
31.	Joints & links	01	10/11/2023		**TLM1**	CO3	T2,R1	
32.	configurations	01	10/11/2023		**TLM1**	CO3	T2,R1	
33.	Applications of robotics.	01	11/11/2023		**TLM1**	CO3	T2,R1	
No. of classes required to complete UNIT-III		**9**			**No. of classes taken:33**			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	19/09/2023	11/11/2023	8
I Mid Examinations	13/11/2023	18/11/2023	1
II Phase of Instructions	20/11/2023	13/01/2024	8
II Mid Examinations	15/01/2024	20/01/2024	1
Preparation and Practical	22/01/2024	27/01/2024	1
Semester End Examinations	29/01/2024	10/02/2024	2

EVALUATION PROCESS:

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the principles of thermal sciences to design and develop various thermal systems.

PSO 2	To apply the principles of manufacturing technology, scientific management towards Improvement of quality and optimization of engineering systems in the design, analysis and manufacturability of products.
PSO 3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr. Murahari Kolli**	**Dr. Seelam Pichi Reddy**	**Dr.M.B.S.S.Reddy**	**Dr.M.B.S.S.Reddy**
Signature				

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DEPARTMENTOFMECHANICALENGINEERING
L.B.REDDYNAGAR,MYLAVARAM,KRISHNADIST.,A.P. 521230.

COURSE HANDOUT
PART-A

Name of Course Instructor : Dr. K. AppaRao, Professor,

Dr. M B S Sreekara Reddy, Associate Professor,
Dr. V.Dhana Raju, Associate Professor,
Mr. V.Sankararao, Sr. Assistant Professor

Course Name & Code	: Engineering Graphics–23ME01	
L-T-P Structure	: 3-0-4	**Credits:** 3
Program/Sem/Sec	: B.Tech/ISem/ A-Section	**A.Y.:** 2023-24
PREREQUISITE	: Engineering Physics, Mathematics	

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To enable the students with various concepts like dimensioning, conventions and standards related to
- Engineering Drawing
- To impart knowledge on the projection of points, lines and plane surfaces
- To improve the visualization skills for better understanding of projection of solids
- To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
- To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

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

CO1	Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. (**Understand**)
CO2	Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. (**Apply**)
CO3	Understand and draw projection of solids in various positions in first quadrant. (**Apply**)
CO4	Able to draw the development of surfaces of simple objects (**Apply**)
CO5	Prepare isometric and orthographic sections of simple solids. (**Apply**)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3								2	3	3	3
CO2	3	3	2	2								2	1	2	2
CO3	3	3	2	2								2	1	2	2
CO4	3	3	2	2								2	1	2	2
CO5	3	3	2	2								2	1	2	2
	1-Low				**2–**Medium					**3 -**High					

Textbook:
1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

Reference Books:
1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.
3. Engineering Drawing with an Introduction to AutoCAD, DhananjayJolhe, Tata McGraw Hill, 2017.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:INTRODUCTION TO ENGINEERING GRAPHICS,LETTERING, SCALES,CURVES, ORTHOGRAPHIC PROJECTIONS

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.	**UNITI:INTRODUCTION:** Introduction to Engineering Graphics, CEOs, COs , PEOs & POs	1	19-09-2023		TLM2	
2.	Engineering Graphics and their significance, Drawing Instruments and their use, **Scales:** Plain scales, diagonal scales and vernier scales.	2	19-09-2023		TLM1/ TLM2	
3.	**Curves:** Construction of ellipse, parabola and hyperbola by general method	1	22-09-2023		TLM1	
4.	Practice	3	22-09-2023		TLM3	
5.	Cycloid, Epicycloid, Hypocycloid	1	26-09-2023		TLM1	
6.	Practice	2	26-09-2023		TLM3	
7.	Involutes	1	29-09-2023		TLM1	
8.	Practice	3	29-09-2023		TLM3	
9.	**Orthographic Projections**: Reference plane	1	03-10-2023		TLM1	
10.	Importance of reference lines or Plane	2	03-10-2023		TLM1	
11.	Projections of a point situated in any one of the four quadrants.	1	06-10-2023		TLM1	
12.	Practice	3	06-10-2023		TLM3	
No.ofclassesrequiredtocompleteUNIT-I:21(Lecture:10, Practice: 11)				**No. of classes taken: (including Practice)**		

UNIT-II: PROJECTIONS OF STRAIGHT LINES & PROJECTIONS OF PLANES

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 Projections, First and third angle projection methods	1	10-10-2023		TLM1	
14.	Projections of straight lines parallel to both reference planes	2	10-10-2023		TLM1	
15.	Practice	2	13-10-2023		TLM1	
16.	Projections of straight lines perpendicular to one reference plane and parallel to other reference plane	2	13-10-2023		TLM3	
17.	Practice	3	17-10-2023		TLM1	
18.	Projections of straight lines inclined to one reference plane and parallel to the other reference plane	1	27-10-2023		TLM3	

S. No.	Topics to becovered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	Practice	3	27-10-2023		TLM1	
20.	**Projections of Planes:** Regular planes Perpendicular to both reference planes	1	31-10-2023		TLM1	
21.	Practice	2	31-10-2023		TLM3	
22.	Practice	2	03-11-2023		TLM1	
23.	parallel to one reference plane and inclined to the other reference plane;	2	03-11-2023		TLM3	
24.	Practice	3	07-11-2023		TLM1	
25.	Plane inclined to both the reference planes	1	10-11-2023		TLM3	
26.	Practice	3	10-11-2023		TLM3	
No. of classes required to complete UNIT-II:28(Lecture:10 Practice:18)				**No. of classes taken: (including Practice)**		

UNIT-III: PROJECTIONS OF SOLIDS

S. No.	Topicsto becovered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	**UNITIII: PROJECTIONS OF SOLIDS:** Introduction, Types of solids: Polyhedra and Solids of revolution	1	21-11-2023		TLM1	
25.	Projections of solids in simple positions: Axis perpendicular to horizontal plane	2	21-11-2023		TLM3	
26.	Practice	4	24-11-2023		TLM3	
27.	Axis perpendicular to vertical plane and Axis parallel to both the reference planes	1	24-11-2023		TLM1	
28.	Practice	2	25-11-2023		TLM3	
29.	Projection of Solids with axis inclined to one reference plane and parallel to another plane	2	27-11-2023		TLM1	
30.	Practice	2	27-11-2023		TLM3	
No. of classes required to complete UNIT-III:14 (Lecture: 06, Practice: 08)				**No. of classes taken: (including Practice)**		

UNIT-IV: SECTIONS OF SOLIDS & DEVELOPMENT OF SURFACES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	Perpendicular and inclined section planes	1	28-11-2023		TLM1	
32.	Practice	2	28-11-2023		TLM3	
33.	Sectional views and True shape of section	2	01-12-2023		TLM1	

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
34.	Practice	2	01-12-2023		TLM3	
35.	Sections of solids in simple position only	1	05-12-2023		TLM1	
36.	Practice	2	05-12-2023		TLM3	
37.	**Development of Surfaces:** Methods of Development, Parallel line development and radial line development	2	08-12-2023		TLM2	
38.	Development of a cube, prism, cylinder	2	08-12-2023		TLM3	
39.	Practice	3	12-12-2023		TLM3	
40.	Development of a pyramid and cone	2	15-12-2023		TLM1	
41.	Practice	2	15-12-2023		TLM3	

No. of classes required to complete UNIT-IV:21 (Lecture: 10, Practice: 11)	No. of classes taken:(including Practice)

UNIT-V: CONVERSION OF VIEWS & COMPUTER GRAPHICS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Introduction to isometric & orthographic views	1	19-12-2023		TLM1	
43.	Conversion of isometric views to orthographic views	2	19-12-2023		TLM1	
44.	Practice	2	22-12-2023		TLM3	
45.	Practice	2	22-12-2023		TLM3	
46.	Conversion of orthographic views to isometric views	1	26-12-2023		TLM1	
47.	Practice	2	26-12-2023		TLM3	
48.	Practice	2	29-12-2023		TLM3	
49.	**Computer graphics:** Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD	2	29-12-2023		TLM2	

No. of classes required to complete UNIT-V: 14(Lecture:06, Practice: 08)	No. of classes taken:

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
I-Descriptive Examination (Units-I, II)	M1=15
II-Descriptive Examination (UNIT-III, IV & V)	M2=15
Day to Day Evaluation	15
Mid Marks = 80% of Max (M1,M2) + 20% of Min ((M1,M2) +Day to Day Evaluation	M=30
Cumulative Internal Examination (CIE)	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multi disciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMMESPECIFICOUTCOMES (PSOs):

PSO1	To apply the principles of thermal sciences to design and develop various thermal systems.
PSO2	To apply the principles of manufacturing technology, scientific management towards improvement of quality and optimization of engineering systems in the design, analysis and manufacturability of products.
PSO3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr. K. Appa Rao, Dr. M B S S Reddy, Dr.V.Dhana Raju, V.Sankararao		Dr. M B S S Reddy	Dr. M B S S Reddy
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi, NAAC Accredited with 'A' grade, Accredited by NBA, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, NTR District, Andhra Pradesh.

COURSE HANDOUT

PART-A

NameofCourseInstructor: V.Sowjanya / P.Madhavi
CourseName&Code   : IT Workshop Lab (23IT51)
L-T-P Structure   :0-0-2   **Credits:**1
Program/Sem/Sec   :B.Tech I Sem Mech   **A.Y.:**2023-24

PRE-REQUISITE: Basic knowledge of computer system

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of The IT Workshop is a training lab course to get training on PC Hardware, Internet & World Wide Web, and Productivity tools for documentation, Spread sheet computations, and Presentation.

COURSEOUTCOMES(COs): Attheendofthecourse,studentsareableto

CO1	Perform Hardware troubleshooting
CO2	Understand Hardware components and inter dependencies
CO3	Safeguard computer systems from viruses/worms.
CO4	Document/ Presentation preparation
CO5	Perform calculations using spreadsheets

COURSE ARTICULATIONMATRIX (Correlation between COs, POs&PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1											1	
CO2	3	1	1											1	
CO3	3	1												1	
CO4	3	1												1	
CO5	3	2												1	

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

COURSEDELIVERYPLAN(LESSONPLAN):Section-A

S.No.	Topicstobecovered	No.of Classes Required	Tentative Date ofCompleti on	Actual Date ofCompleti on	Teaching Learning Methods	HOD Sign Weekly
1	**LaTeX and WORD** **Task 1 –** Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeXand word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word. **Task 2:** Using LaTeX and Word to create a project certificate. Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both La TeX and Word.	3	25.09.23		TLM4	
2	**Task 3:** Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes. **Task 4:** Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.	3	09.10.23		TLM4	
3	**EXCEL** **Excel Orientation:** The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources. **Task 1:** Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text	3	16.10.23		TLM4	

4	**Task 2:** Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, **LOOKUP/VLOOKUP** **Task 3**: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting	3	30.10.23		TLM4
5	**POWER POINT** **Task 1:** Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.	3	06.11.23		TLM4
6	**Task 2:** Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts. **Task 3:** Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides	3	20.11.23		TLM4
7	**AI TOOLS – ChatGPT** **Task 1:** Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them. Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?" **Task 2:** Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas. Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality." **Task 3:** Language Translation:	3	27.11.23		TLM4

	Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are. • Ex:Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"					
8	**Internet & World Wide Web** **Task1:** Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally, students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN. **Task 2:** Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop-up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured. **Task 3**: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student. **Task 4:** Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.	3	04.12.23		TLM4	
9	**PC Hardware** & Software Installation **Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. **Task 2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go	3	11.12.23		TLM4	

	through the video which shows the process of assembling a PC. A video would be given as part of the course content.				
10	**Task 3**: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva. **Task 4:** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva **Task 5:** Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva	3	18.12.23		TLM4
11	Internal lab Exam	3	08.01.24		TLM4

TeachingLearningMethods			
TLM1	Chalkand Talk	**TLM4**	Demonstration(Lab/FieldVisit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	GroupDiscussion/Project

PART-C

EVALUATIONPROCESS(R20Regulations):
According to Academic Regulations of R23 Distribution and Weightage of Marks For Laboratory Courses is as follows.

(a) Continuous Internal Evaluation(CIE): The Continuous Internal Evaluation(CIE) is based on the following parameters:

Parameter	Marks
DaytoDaywork	10
Record	05
InternalTest	15
Total	30

(b) Semester End Examinations(SEE):

TheSemesterEndexaminations(SEE)forlaboratorycoursesshallbejointlyconductedbyinternalandexternalexaminerswith3hoursdurationandevaluatedfor35marks.
Theperformanceofthestudent shallbeevaluatedaspertheparametersindicatedbelow:

Parameter	Marks
Procedure/Algorithm	10
Experimentation/Programexecution	20
Observations/Calculations/Validation	20
Result/Inference	10
Vivavoce	10
Total	70

PART-D

PROGRAMME OUTCOMES (POs):

PO1	**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineering fundamentals, and an engineering specialization to the solution of complex engineeringproblems.
PO 2	**Problemanalysis**:Identify,formulate,review research literature,and analyze complexengineeringproblemsreachingsubstantiatedconclusionsusingfirstprinciplesofmathematics,natural sciences,andengineering sciences.
PO 3	**Design/developmentofsolutions**:Designsolutionsforcomplexengineeringproblemsand designsystemcomponentsorprocessesthatmeetthespecifiedneeds withappropriateconsiderationforthepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations.
PO 4	**Conductinvestigationsofcomplexproblems**:Useresearch-basedknowledgeandresearchmethodsincludingdesignofexperiments,analysisandinterpretationofdata, andsynthesisoftheinformationtoprovidevalidconclusions.
PO 5	**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,and modernengineeringandITtoolsincludingpredictionandmodellingtocomplexengineering activitieswithanunderstandingofthelimitations
PO 6	**Theengineerandsociety**:Applyreasoninginformedbythecontextualknowledgeto assesssocietal,health,safety,legalandculturalissuesandtheconsequentresponsibilitiesrelevanttotheprofessionalengineering practice
PO 7	**Environmentandsustainability**:Understandtheimpactoftheprofessionalengineeringsolutionsinsocietalandenvironmentalcontexts,anddemonstratethe knowledgeof,andneedforsustainabledevelopment.
PO 8	**Ethics**:Applyethicalprinciplesandcommittoprofessionalethicsandresponsibilities andnormsoftheengineeringpractice.
PO 9	**Individualandteamwork**:Functioneffectivelyasanindividual,andasamemberorleader in diverseteams,and in multidisciplinarysettings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehendandwriteeffectivereportsanddesigndocumentation,makeeffectivepresentations,and give andreceiveclearinstructions.
PO 11	**Project management andfinance**: Demonstrate knowledgeandunderstandingof theengineeringandmanagementprinciplesandapplythesetoone'sownwork,asa memberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments.
PO 12	**Life-longlearning**:Recognizetheneedforandhavethepreparationandabilityto engageinindependentandlife-longlearninginthebroadestcontextoftechnologicalchange.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the principles of thermal sciences to design and develop various thermal systems.
PSO 2	To apply the principles of manufacturing technology, scientific management towards improvement of quality and optimization of engineering systems in the design, analysis and manufacturability of products.
PSO 3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mrs.V.Sowjanya, P.Madhavi	Mr.P.Naga Babu	Dr.D.Venkata Subbaiah	Dr.M.B.S.Sreekara Reddy
Signature				

			Module Coordinator	Head of the Department
	Mrs.V.Sowjanya, P.Madhavi	Mr.P.Naga Babu	Dr.D.Venkata Subbaiah	Dr.M.B.S.Sreekara Reddy

COURSE HANDOUT

PART-A

Name of Course Instructor: B. Sreenivasa Reddy
Course Name & Code : CE LAB, 23FE51
L-T-P Structure : 0-0-2   **Credits:** 01
Program/Sem/Sec : B. Tech- I SEM- MECH
A.Y. : 2023-24

PREREQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews.

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

CO1	Understand the different aspect of the English language proficiency with emphasis on LSRW skills.	L2
CO2	Apply Communication Skills through various language learning activities	L3
CO3	Identifying the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking, comprehension.	L2
CO4	Exhibit professionalism in participating in debates and group discussions.	L3

COURSE ARTICULATION MATRIX
(Correlation between COs & POs)

Course Outcomes PO's →	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1.	-	-	-	2	-	-	-	-	3	3	-	2
CO2.	-	-	-	2	-	-	-	-	3	3	-	2
CO3.	-	-	-	2	-	-	-	-	3	3	-	2
CO4.	-	-	-	2	-	-	-	-	3	3	-	2

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

List of Activities:

1. a. Vowels & Consonants

   b. Neutralization / Accent rules

2. Communication Skills: JAM
3. Conversational Practice: Roleplay
4. e-mail Writing
5. Resume writing, Cover letter, SOP
6. Group Discussions - methods & Practice
7. Debates – Methods and practice
8. PPT Presentations
9. Poster Presentations
10. Interview Skills: Mock Interviews
Note: Any Eight of the listed activates are to be conducted.

Suggested Software:

1.   Walden Infotech
2.   Young India Films

Reference Books:

Raman Meenakshi, Sangeeta-Sharma, *Technical Communication,* Oxford Press 2018.
Taylor Grant: *English Conversation Practice,* Tata McGraw-Hill Education India, 2016.
Hewing's, Martin, Cambridge Academic English (B2), CUP, 2012.
J. Sethi & P.V. Dhamija: *A Course in Phonetics and Spoken English, (*2nd Ed.,*)Kindle, 2013.*

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

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 syllabus	03	21-09-2023		TLM4	
2.	Self Introduction & Introducing others	03	05-10-2023		TLM4	
3.	Vowels & Consonants	03	12-10-2023		TLM1, TLM5	
4.	Neutralization / Accent rules	03	19-10-2023		TLM1, TLM5	
5.	JAM-I(Short and Structured Talks)	03	26-10-2023		TLM4	
6.	Role Play-I(Formal and Informal)	06	02-11-2023 09-11-2023		TLM4	
7.	e-mail Writing, Resume writing, Cover letter, SOP	03	16-11-2023		TLM1, TLM5	

8.	Group Discussion	06	23-11-2023 30-11-2023		TLM4, TLM6	
9.	Debate	06	07-12-2023 14-12-2023		TLM4, TLM6	
10.	PPT & Poster Presentation	03	21-12-2023 04-01-2024		TLM2, TLM4	
11.	Mock Interviews / Lab Internal Exam	03	11-01-2024		TLM1, TLM6	
No. of classes required to complete Syllabus: 42				**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

Laboratory Examination:

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

PROGRAMME OUTCOMES (POs):

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

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

	Course Instructor	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**B. Sreenivasa Reddy**	**Dr. R. Padma**	**Dr. A. Ramireddy**	**Dr. A. Ramireddy**
Signature				

DEPARTMENT OF FRESHMAN ENGINEERING

COURSE HANDOUT

Part-A

PROGRAM	:	B.Tech.,I-Sem.,ME -A
ACADEMIC YEAR	:	2023-2024
COURSE NAME & CODE	:	ENGINEERING PHYSICS LAB
L-T-P STRUCTURE	:	0-0-3
COURSE CREDITS	:	1
COURSE INSTRUCTOR	:	Dr.N.Aruna/Mr. N.T Sarma
COURSE COORDINATOR	:	Dr.S.Yusub

Course Objectives:
To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes:
CO1: Analyze the wave properties of light using optical instruments (Apply-L3).
CO2: Estimate the elastic modulii of various materials and acceleration due to gravity (Apply-L3).
CO3: Demonstrate the vibrations in stretched strings (Understand-L2).
CO4: Evaluate dielectric constant and magnetic field of circular coil carrying current (Apply-L3).
CO5: Examine the characteristics of semiconductor devices (Apply-L3).

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

Engineering Physics Lab													
COURSE DESIGNED BY	FRESHMAN ENGINEERING DEPARTMENT												
Course Outcomes	Programme Outcomes												
PO's →	1	2	3	4	5	6	7	8	9	10	11	12	

CO1.	**3**	**3**	**2**	**1**			**1**	1			**1**
CO2.	**3**	**3**	**2**	**1**			**1**	1			**1**
CO3.	**3**	**3**	**2**	**1**			**1**	1			**1**
CO4.	**3**	**3**	**2**	**1**			**1**	1			**1**
CO5.	**3**	**3**	**2**	**1**			**1**	**1**			**1**
1 = slight (Low)		**2 = Moderate (Medium)**				**3 = Substantial (High)**					

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

BOS APPROVED TEXT BOOKS:

1. Lab Manual Prepared by the LBRCE.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section- AI&DS

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	3	23-09-2023		**TLM4**	
2.	Demonstration	3	30-09-2023		**TLM4**	
3.	Experiment 1	3	07-10-2023		**TLM4**	
4.	Experiment 2	3	21-10-2023		**TLM4**	
5.	Experiment 3	3	28-10-2023		**TLM4**	
6.	Experiment 4	3	04-11-2023		**TLM4**	
7.	Experiment 5	3	18-11-2023		**TLM4**	
8.	Experiment 6	3	25-11-2023		**TLM4**	
9.	Experiment 7	3	02-12-2023		**TLM4**	
10.	Experiment 8	3	16-12-2023		**TLM4**	
11.	Experiment 9	3	23-12-2023		**TLM4**	
12.	Experiment 10	3	23-12-2023		**TLM4**	
13.	**Internal Exam**	3	30-12-2023			
14.	**Internal Exam**	3	06-01-2024			
	No. of classes required to complete Syllabus:			42		

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

EVALUATION PROCESS:

Evaluation Task	Marks
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

1.To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.
2. To Function professionally in the rapidly changing world with advances in technology.
3. To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.
4. To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner .

PROGRAM OUTCOMES:

Engineering Graduates will be able to:
(**1**). **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
(**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.
(**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.
(**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.
(**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.
(**6**). **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess

societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

(7).**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

(9). **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

(10). **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

(11). **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

(12).**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

Graduate of the ECE will have the ability to

(1) Design and develop modern communication technologies for building the inter disciplinary skills to meet   current and future needs of industry.

(2) Design and AnalyzeAnalog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

(3) Apply the Signal processing techniques to synthesize and realize the issues related to real time applications.

Dr.N.Aruna/Mr. N.T Sarma	Dr. S. Yusub	Dr. S. Yusub	Dr A. Rami Reddy
Course Instructor	Course Coordinator	Module Coordinator	HOD

DEPARTMENT OF MECHANICAL ENGINEERING
COURSE HANDOUT

PROGRAM   : B.Tech. I-Sem, Mechanical Engineering

ACADEMIC YEAR   : 2023-24

COURSE NAME & CODE   : Engineering Workshop, 20ME51

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

COURSE CREDITS   : 1.5

COURSE INSTRUCTOR   : Dr. L. Prabhu, Assoc. Professor,

         Ms. P. Mounika, Asst. Professor

COURSE COORDINATOR : Seelam Srinivasa Reddy, Assoc. Professor

PRE REQUISITE: Knowledge in dimensions and units, Usage of geometrical instruments and analytical ability

COURSE OBJECTIVE:

    The objective of this course is to get familiarized with various trades used in Engineering Workshop and learn the safety pre-cautions to be followed in the workshops, while working with the different tools.

COURSE OUTCOMES (CO)

CO1	Design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint.
CO2	Fabricate and model various basic prototypes in the trade of fitting such as Straight fit, V-fit.
CO3	Produce various basic prototypes in the trade of Tin smithy such as Rectangular tray, and open Cylinder.
CO4	Perform various basic House Wiring techniques.

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		2	3	3	3			3			2		3	2
CO2	3		2	3	3	3			3			2		3	2
CO3	3		2	3	3	3			3			2		3	2
CO4	3		2	3	3	3			3			2		3	2

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

REFERENCE:

R1	LabManual

COURSE DELIVERY PLAN (LESSON PLAN): Section-A (BATCH-A1)

S. No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
1.	Induction Programme	3	20-09-2023		TLM8	-	
2.	Demonstration	3	27-09-2023		TLM8	R1	
3.	Experiment-1	3	04-10-2023		TLM8	R1	
4.	Experiment-2	3	11-10-2023		TLM8	R1	
5.	Experiment-3	3	18-10-2023		TLM8	R1	
6.	Experiment-4	3	25-10-2023		TLM8	R1	
7.	Experiment-5	3	01-11-2023		TLM8	61	
I-Mid Examinations (13.11.2023 to 18.11.2023)							
8.	Experiment-6	3	22-11-2023		TLM8	R1	
9.	Experiment-7	3	29-11-2023		TLM8	R1	
10.	Experiment-8	3	06-11-2023		TLM8	R1	
11.	Repetition lab	3	13-12-2023 20-12-2023		TLM8		
12.	Lab Internal	3	27-12-2023		TLM6		

COURSE DELIVERY PLAN (LESSON PLAN): Section-A (BATCH-A2)

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
1.	Induction Programme	3	20-09-2023		TLM8	-	
2.	Demonstration	3	27-09-2023		TLM8	R1	
3.	Experiment-1	3	04-10-2023		TLM8	R1	
4.	Experiment-2	3	11-10-2023		TLM8	R1	
5.	Experiment-3	3	18-10-2023		TLM8	R1	
6.	Experiment-4	3	25-10-2023		TLM8	R1	
7.	Experiment-5	3	01-11-2023		TLM8	R1	
I-Mid Examinations (13.11.2023 to 18.11.2023)							
8.	Experiment-6	3	22-11-2023		TLM8	R1	

9.	Experiment-7	3	29-11-2023		TLM8	R1	
10.	Experiment-8	3	06-11-2023		TLM8	R1	
11.	Repetition	3	13-12-2023 20-12-2023		TLM8	R1	
12.	Lab Internal	3	27-12-2023		TLM6	-	

Teaching Learning Methods

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
Induction Programme	31-08-2023	16-09-2023	
I Phase of Instructions-1	19-09-2023	11-11-2023	8W
I Mid Examinations	13-11-2023	11-11-2023	1W
II Phase of Instructions	20-11-2023	06-01-2024	8W
II Mid Examinations	15-01-2024	06-01-2024	1W
Preparation and Practical's	22-01-2024	20-01-2024	2W
Semester End Examinations	29-01-2024	03-02-2024	2W

Part-C

EVALUATION PROCESS:

Parameter	Marks
Day–to–Day Work	A1=10 Marks
Record And Observation	B1= 05 Marks
Internal Test	C1 = 15 Marks
Cumulative Internal Examination (CIE = A1 + B1 + C1)	A1+B1+C1=30Marks
Semester End Examinations (SEE)	D1 = 70 Marks
Total Marks : A1+B1+C1+D1	100 Marks

Details of Batches: A-SEC

Batch No.	Reg.No.of Students	Number of Students	Batch No.	Reg.No.of Students	Number of Students
B11	23MEC01-08	08	B21	23MEC39,40, 42-44,45-47	08
B12	23MEC09-17	09	B22	23MEC48-57	09
B13	23MEC18-24,28	08	B23	23MEC58,60-66	08
B14	23MEC29-36,38	09	B24	23MEC67-74	08

Batch No:	Exp. 01	Exp. 02	Exp. 03	Exp. 04	Exp. 05	Exp. 06	Exp. 07	Exp. 08
B11	C1	C2	F1	F2	P1	P2	E1	E2
B12	C2	C1	F2	F1	P2	P1	E2	E1
B13	F1	F2	C1	C2	E1	E2	P1	P2
B14	F2	F1	C2	C1	E2	E1	P2	P1
B21	C1	C2	F1	F2	P1	P2	E1	E2
B22	C2	C1	F2	F1	P2	P1	E2	E1
B23	F1	F2	C1	C2	E1	E2	P1	P2
B24	F2	F1	C2	C1	E2	E1	P2	P1

LIST OF EXPERIMENTS:

Exp. No.	Name of the Experiment	Related CO
1.	Carpentry-1(C1)-Corner Bridle Joint	CO1
2.	Carpentry-2(C2)-Dove tail Joint	CO1
3.	Fitting-1(F1)-T-Joint	CO2
4.	Fitting-2(F2)-V-Joint	CO2
5.	Plumbing-1(P1)-Pipe Threading practice	CO3
6.	Plumbing-2(P2)-Pipe Layout	CO3
7.	House Wiring-1(E1)–Series and Parallel connection	CO4
8.	HouseWiring-2(E2)–Fluorescent Lamp and Calling Bell Circuit	CO4

NOTIFICATION OF CYCLE:

cycle	Exp. No.	Name of the Experiment	Related CO
Cycle 1	1.	Carpentry-1(C1)-Corner Bridle Joint	CO1
	2.	Carpentry-2(C2)-Dove tail Joint	CO1
	3.	Fitting-1(F1)-T-Joint	CO2
	4.	Fitting-2(F2)-V-Joint	CO2
	5.	Plumbing-1(P1)-Pipe Threading practice	CO3
Cycle 2	6.	Plumbing-2(P2)-PipeLayout	CO3
	7.	House Wiring-1(E1)–Series and Parallel Connection	CO4
	8.	House Wiring-2(E2)–Fluorescent Lamp and Calling bell Circuit	CO4

PROGRAMME EDUCATIONAL OBJECTIVES:

PEO1: To build a professional career and pursue higher studies with sound knowledge in Mathematics, Science and Mechanical Engineering.

PEO2: To inculcate strong ethical values and leadership qualities for graduates to become successful in multi disciplinary activities.

PEO3: To develop inquisitiveness towards good communication and lifelong learning.

PROGRAM OUT COMES (POs)

Engineering Graduates will be able to :

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyses complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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.

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.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multi disciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instruction

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. To apply the principles of thermal sciences to design and develop various thermal systems.
2. To apply the principles of manufacturing technology, scientific management towards Improvement of quality and optimization of engineering systems in the design, analysis and manufacture ability of products.
3. To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Course Instructors	Course Coordinator	Module Coordinator	HOD
Dr. L. Prabhu, Ms. P. Mounika	S.Srinivasa Reddy	Dr. M. B. S Sreekara Reddy	Dr. M. B. S Sreekara Reddy