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 and 50001:2018 Certified Institution

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

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FRESHMAN ENGINEERING DEPARTMENT

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COURSE HANDOUT

Part-A

PROGRAM	**:** II B. Tech., I-Sem., ASE
ACADEMIC YEAR	**:** 2026-27
COURSE NAME & CODE	**:** NM&TT & 23FE06
L-T-P STRUCTURE	**:** 3-0-0
COURSE CREDITS	**:** 3
COURSE INSTRUCTOR	**:** Dr. K. JHANSI RANI
COURSE COORDINATOR	**:** Mrs. SHAIK HASEENA BEGUM
PRE-REQUISITES	**:** Basics of Differentiation, Integration.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To elucidate the different numerical methods to solve non linear algebraic equations.
- To disseminate the use of different numerical techniques for carrying out numerical integration.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

COURSE OUTCOMES (COs)

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

CO1: Evaluate the approximate roots of polynomial and transcendental equations by different algorithms. Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)

CO2: Apply numerical integral techniques to different Engineering problems. Apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations(L3)

CO3: Apply the Laplace transform for solving differential equations(L3)

CO4: Find or compute the Fourier series of periodic signals(L3)

CO5: Know and be able to apply integral expressions for the forwards and inverse Fourier Transform to a range of non-periodic waveforms (L3)

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

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

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**

1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

BOS APPROVED TEXT BOOKS:

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

T2 B. V. Ramana, "*Higher Engineering Mathematics*", 2007Edition , Tata McGraw Hill Education.

BOS APPROVED REFERENCE BOOKS:

R1 Erwin Kreyszig, *"Advanced Engineering Mathematics"*, 10th Edition, John Wiley – India.

R2 Steven c.chopra, "*Applied numerical methods with MAT lab for engineering and science*", Tata McGraw Hill Education.

R3 R.K. Jain and S.R.K. Iyengar, "*Numerical methods for Scientificand engineering computation",* New age international publications.

R4 Lawrence Turyn, "*Advanced engineering mathematics",* CRC press.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the course	1	13- 07 - 26		TLM1			
2.	Course Outcomes, Program Outcomes	1	14- 07 - 26		TLM1			

UNIT-I: Iterative Methods

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
3.	Introduction to Unit I	1	15- 07 - 26		TLM1	CO1	T1,T2	
4.	Bisection method	1	16- 07 - 26		TLM1	CO1	T1,T2	
5.	Secant method	1	20- 07 - 26		TLM1	CO1	T1,T2	
6.	False – position method	1	21- 07 - 26		TLM1	CO1	T1,T2	
7.	False – position method	1	22- 07 - 26		TLM1	CO1	T1,T2	
8.	Iteration method	1	23- 07 - 26		TLM1	CO1	T1,T2	
9.	Newton – Raphson method	1	27- 07 - 26		TLM1	CO1	T1,T2	
10.	Simultaneous equations	1	28- 07 - 26		TLM1	CO1	T1,T2	
11.	Simultaneous equations	1	29- 07 - 26		TLM1	CO1	T1,T2	
12.	Newton's forward interpolation	1	30- 07 - 26		TLM1	CO1	T1,T2	
13.	Newton's backward interpolation	1	03- 08 - 26		TLM1	CO1	T1,T2	
14.	Lagrange's interpolation for unequal parts	1	04- 08 - 26		TLM1	CO1	T1,T2	
15.	Lagrange's interpolation for unequal parts	1	06- 08 - 26		TLM1	CO1	T1,T2	
16.	Tutorial – I	1	05- 08 - 26		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-I		16			No. of classes taken:			

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly

17.	Introduction to Unit - 2	1	10- 08 - 26		TLM1	CO2	T1,T2	
18.	Trapezoidal rule	1	11- 08 - 26		TLM1	CO2	T1,T2	
19.	Simpson's 1/3 rule	1	12- 08 - 26		TLM1	CO2	T1,T2	
20.	Simpson's 3/8 rule	1	13- 08 - 26		TLM1	CO2	T1,T2	
21.	Taylor's series method	1	17- 08 - 26		TLM1	CO2	T1,T2	
22.	Taylor's series method	1	18- 08 - 26		TLM1	CO2	T1,T2	
23.	Picard's method	1	19- 08 - 26		TLM1	CO2	T1,T2	
24.	Euler's method	1	20- 08 - 26		TLM1	CO2	T1,T2	
25.	Runge – Kutta method of 2^{nd} order	1	24- 08 - 26		TLM1	CO2	T1,T2	
26.	Runge – Kutta method of 4^{th} order	1	25- 08 - 26		TLM1	CO2	T1,T2	
27.	Runge – Kutta method of 4^{th} order	1	27- 08 - 26		TLM1	CO2	T1,T2	
28.	Milne's predictor and corrector method	1	31- 08 - 26		TLM1	CO2	T1,T2	
29.	Milne's predictor and corrector method	1	01- 09 - 26		TLM1	CO2	T1,T2	
30.	Revision	1	03- 09 - 26		TLM1	CO2	T1,T2	
31.	Tutorial – II	1	02- 09 - 26		TLM3	CO2	T1,T2	
No. of classes required to complete UNIT-II		15			No. of classes taken:			

I MID EXAMINATIONS (07-09-2026 TO 09-09-2026)

UNIT-III: LAPLACE TRANSFORMS

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	10- 09 - 26		TLM1	CO3	T1,T2	
33.	Laplace transform of standard functions	1	15- 09 - 26		TLM1	CO3	T1,T2	
34.	Properties	1	16- 09 - 26		TLM1	CO3	T1,T2	
35.	Shifting theorems	1	17- 09 - 26		TLM1	CO3	T1,T2	
36.	Transforms of derivatives & integrals	1	21- 09 - 26		TLM1	CO3	T1,T2	
37.	Unit step function& Dirac's delta function	1	22- 09 - 26		TLM1	CO3	T1,T2	
38.	Inverse Laplace by partial fractions	1	23- 09 - 26		TLM1	CO3	T1,T2	
39.	Inverse Laplace by Convolution theorem	1	24- 09 - 26		TLM1	CO3	T1,T2	
40.	Applications to ODE	1	28- 09 - 26		TLM1	CO3	T1,T2	
41.	Integral equations	1	29- 09 - 26		TLM1	CO3	T1,T2	
42.	Tutorial - III	1	30- 09 - 26		TLM1	CO3	T1,T2	

No. of classes required to complete UNIT-III	11	No. of classes taken:

UNIT-IV: FOURIER SERIES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
43.	Introduction to Unit - IV	1	01- 10 - 26		TLM1	CO4	T1,T2	
44.	Fourier series of periodic functions	1	05- 10 - 26		TLM1	CO4	T1,T2	
45.	Dirichlet's conditions	1	06- 10 - 26		TLM1	CO4	T1,T2	
46.	Problems on Fourier series	1	07- 10 - 26		TLM1	CO4	T1,T2	
47.	Even and odd functions	1	08- 10 - 26		TLM1	CO4	T1,T2	
48.	Even and odd functions	1	12- 10 - 26		TLM1	CO4	T1,T2	
49.	Change of intervals	1	13- 10 - 26		TLM1	CO4	T1,T2	
50.	Change of intervals	1	15- 10 - 26		TLM1	CO4	T1,T2	
51.	Half range sine & cosine series	1	26- 10 - 26		TLM1	CO4	T1,T2	
52.	Tutorial - IV	1	14- 10 - 26		TLM1	CO4	T1,T2	
No. of classes required to complete UNIT-IV		10			No. of classes taken:			

UNIT-V: Fourier transforms

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
50	Introduction to Unit -V	1	27- 10 - 26		TLM1	CO5	T1,T2	
51	Fourier integrals	1	28- 10 - 26		TLM1	CO5	T1,T2	
52	Fourier sine & cosine integrals	1	29- 10 - 26		TLM1	CO5	T1,T2	
53	Infinite Fourier transforms	1	02- 11 - 26		TLM1	CO5	T1,T2	
54	Infinite Fourier cosine & sine transforms	1	03- 11 - 26		TLM1	CO5	T1,T2	
55	Infinite Fourier cosine & sine transforms	1	04- 11 - 26		TLM1	CO5	T1,T2	
56	Convolution theorem	1	05- 11 - 26		TLM1	CO5	T1,T2	
57	Finite Fourier transforms	1	09- 11 - 26		TLM1	CO5	T1,T2	
58	Tutorial - V	1	10- 11 - 26		TLM3	CO5	T1,T2	
No. of classes required to complete UNIT-V		09			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

61	To find current using Laplace in simple electrical circuits	1	11-11-26		TLM2	CO3	T1,T2	
No. of classes		1			No. of classes taken:			
II MID EXAMINATIONS (03-11-2025 TO 08-11-2025)								

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

PART-CEVALUATION PROCESS (R23 Regulation):

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

PART-D PROGRAMME OUTCOMES (POs):

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

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

Dr. K. JHANSI RANI	**Ms. SHAIK HASEENA BEGUM**	**Dr. A. RAMI REDDY**	**Dr. T. SATYANARAYANA**
Course Instructor	Course Coordinator	Module Coordinator	HOD

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COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. P.Ravindra Kumar

Course Name & Code : **UHV2–Understanding harmony and Ethical human conduct (23HS01)**

L-T-P Structure : 2-1-0 **Credits** : 3

Program/Sem/Sec : B.Tech III Semester – ASE **A.Y.** : 2026-27

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

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

CO1	Describe the terms like Natural Acceptance, Happiness and Prosperity. **(Understanding-L2)**
CO2	Identify one's self, and one's surroundings (family, society nature). **(Understanding-L2)**
CO3	Relate human values with human relationship and human society. **(Understanding-L2)**
CO4	Illustrate the need for universal human values and harmonious existence. **(Understanding-L2)**
CO5	Develop as socially and ecologically responsible engineers. **(Applying -L3)**

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

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

TEXTBOOKS:

T1 R R Gaur, r singal, G P Bagaria, "Human values and Professional Ethics", Excel Books, New Delhi,2010

REFERENCE BOOKS:

R1 Jeevan vidya: Ek Parichaya, A.Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999

R2 Human values, A N Tripathi, New Age Publishers, New Delhi, 2004

R3 The story of my experiments with Truth, Mohandas Karamchand Gandhi

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Value Education

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, COs, POs /PSOs and course articulation matrix, Introduction about the course	1	13-07-2026		TLM1,2	
2.	Right Understanding, Relationship, and Physical Facility	1	14-07-2026		TLM1,2	
3.	Understanding Value Education	1	15-07-2026		TLM1,2	
4.	Sharing about Oneself	1	18-07-2026		TLM6	
5.	Self-exploration as the Process for Value Education	1	20-07-2026		TLM1,2	
6.	Continuous Happiness and Prosperity – the Basic Human Aspirations	1	21-07-2026		TLM1,2	
7.	Exploring Animal Consciousness and Human Consciousness	1	22-07-2026		TLM1,2	
8.	Happiness and Prosperity – Current Scenario	1	25-07-2026		TLM6	
9.	Method to Fulfill the Basic Human Aspirations	1	27-07-2026		TLM1,2	
10.	Exploring Natural Acceptance	1	28-07-2026		TLM1,2	
11.	Activity based learning /Assignment/Tutorial 1/Quiz	1	29-07-2026		TLM3	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Harmony in the Human Being

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Understanding Human being as the Co-existence of the self and the body.	1	01-08-2026		TLM1,2	
13.	Distinguishing between the Needs of the self and the body	1	03-08-2026		TLM1,2	
14.	Exploring the difference of Needs of self and body.	1	04-08-2026		TLM1,2	
15.	The body as an Instrument of the self	1	05-08-2026		TLM1,2	
16.	Understanding Harmony in the self	1	10-08-2026		TLM1,2	

17.	Exploring Sources of Imagination in the self	1	11-08-2026		TLM1,2	
18.	Harmony of the self with the body	1	12-08-2026		TLM1,2	
19.	Program to ensure self-regulation and Health	1	17-08-2026		TLM1,2	
20.	Exploring Harmony of self with the body	1	18-08-2026		TLM1,2	
21.	Activity based learning /Assignment/Tutorial 2/Quiz	1	19-08-2026		TLM3	
22.	Revision 1	1	22-08-2026		TLM6	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III: Harmony in the Family and Society

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.	Harmony in the Family – the Basic Unit of Human Interaction	1	24-08-2026		TLM1,2	
24.	'Trust' – the Foundational Value in Relationship	1	25-08-2026		TLM1,2	
25.	Exploring the Feeling of Trust	1	26-08-2026		TLM1,2	
26.	'Respect' – as the Right Evaluation	1	29-08-2026		TLM1,2	
27.	Exploring the Feeling of Respect	1	31-08-2026		TLM1,2	
28.	Other Feelings, Justice in Human-to-Human Relationship	1	01-09-2026		TLM1,2	
29.	Understanding Harmony in the Society	1	02-09-2026		TLM1,2	
30.	Revision	1	05-09-2026		TLM1,2	
31.	Exploring Systems to fulfil Human Goal	1	14-09-2026		TLM1,2	
32.	Activity based learning	1	15-09-2026		TLM6	
33.	Assignment/Tutorial 3/Quiz	1	16-09-2026		TLM3	
No. of classes required to complete UNIT-III: 11				**No. of classes taken:**		

UNIT-IV: Harmony in the Nature/Existence

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.	Understanding Harmony in the Nature	1	19-09-2026		TLM1,2	
35.	Interconnectedness, self-regulation	1	21-09-2026		TLM1,2	
36.	Mutual Fulfilment among the Four Orders of Nature	1	22-09-2026		TLM1,2	
37.	Exploring the Four Orders of Nature	1	23-09-2026		TLM1,2	
38.	Realizing Existence as Co-existence at All Levels	1	26-09-2026		TLM1,2	
39.	Realizing Existence as Co-existence at All Levels	1	28-09-2026		TLM1,2	

40.	The Holistic Perception of Harmony in Existence	1	29-09-2026		TLM1,2	
41.	Exploring Co-existence in Existence.	1	30-09-2026		TLM1,2	
42.	Activity based learning	1	03-10-2026		TLM6	
43.	Assignment/Tutorial 4/Quiz	1	05-10-2026		TLM3	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Implications of the Holistic Understanding – a Look at Professional Ethics

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Natural Acceptance of Human Values	1	06-10-2026		TLM1,2	
45.	Definitiveness of (Ethical) Human Conduct	1	07-10-2026		TLM1,2	
46.	Exploring Ethical Human Conduct	1	08-10-2026		TLM1,2	
47.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order	1	10-10-2026		TLM1,2	
48.	Competence in Professional Ethics	1	12-10-2026		TLM1,2	
49.	Exploring Humanistic Models in Education	1	13-10-2026		TLM1,2	
50.	Exploring Humanistic Models in Education	1	14-10-2026		TLM1,2	
51.	Holistic Technologies, Production Systems and Management Models Typical Case Studies	1	26-10-2026		TLM1,2	
52.	Strategies for Transition towards Value-based Life and Profession	1	27-10-2026		TLM1,2	
53.	Exploring Steps of Transition towards Universal Human Order	1	28-10-2026		TLM1,2	
54.	Activity based learning	1	31-10-2026		TLM6	
55.	Assignment/Tutorial 5/Quiz	1	02-11-2026		TLM3	
56.	Revision Unit 3	1	03-11-2026		TLM1,2	
57.	Revision Unit 4	1	04-11-2026		TLM1,2	
58.	Revision Unit 5	1	09-11-2026			
No. of classes required to complete UNIT-V: 15				**No. of classes taken:**		

Content beyond the syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Professional Ethics in the Light of Right Understanding	1	10-11-2026		TLM1,2	
2.	Journey towards the Holistic Alternative – The Road Ahead	1	11-11-2026		TLM1,2	

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

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

PROGRAMME EDUCATION 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.

Title	**Course Instructor**	**Module Coordinator**	**Head of the Department**
Signature			
Name of the Faculty	**Dr. P.Ravindra Kumar**	**Dr. B. Srinivasa Rao**	**Dr. P.Lovaraju**

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DEPARTMENT OF AEROSPACE ENGINERRING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. A Revanth Reddy
Course Name & Code : Introduction to aerospace engineering & 23AE01
L-T-P Structure : **2-0-0** **Credits:** 2
Program/Sem/Sec : B.Tech./ III-Sem **A.Y.:** 2026-27

PREREQUISITE: Engineering Mechanics

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO1	Describe functions of various external and internal component of an airplane (L2)
CO2	Classify the various forces and moments acting on an airfoil, (L2)
CO3	Differentiate the working principles of various aircraft engines systems. (L2)
CO4	Formulate the basic aspects of space flight. (L3)

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

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

TEXTBOOKS:

T1 Anderson Marry L Bowden S., Introduction to flight, Ninth Edition, McGraw- Hill Education, 2021

REFERENCE BOOKS:

R1 Houghon. E. L Carpenter P.W., Aerodynamics for Engineering students, Sevnth Edition Butterworth-Heinemann,2017

R2 E. Rathakrishnan.,Introduction to Aerospace Engineering (Basic principle of flight) Wiley, First Edition,2021

R3 Kermode, A.C, Mechanics of flight,eleventh Edition,Pearson Education, 2007

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Basic Aspects

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.	History-Early Planes	1	13-07-2026		TLM1	
2.	Components of airplane and their Functions, types	1	15-07-2026		TLM1	
3.	Types of Flight vehicles, classifications	2	17-07-2026 20-07-2026		TLM1	
4.	Standard Atmosphere, Altitude	2	22-07-2026 24-07-2026		TLM1	
5.	Hydrostatic Equation,	1	27-07-2026		TLM1	
6.	Geopotential and geometric altitude	2	29-07-2026 31-07-2026		TLM1	
No. of classes required to complete UNIT-I: 9				**No. of classes taken:**		

UNIT-II: Basic Aerodynamics

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
7.	Airfoils (nomenclature)	1	03-08-2026		TLM1	
8.	NACA Airfoils	2	05-08-2026 07-08-2026		TLM1	
9.	Geometry, Aerodynamic Forces	2	10-08-2026 12-08-2026		TLM1	
10.	Lift, Drag and Moment Coefficients, Co-Efficient of Pressure,	2	14-08-2026 17-08-2026		TLM1	
11.	Centre of Pressure, Aerodynamics Centre, Pressure Distribution Over Aerofoil	2	19-08-2026 21-08-2026		TLM1	
12.	Types of Drag	1	24-08-2026		TLM3	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

Mid 1 Exams: 07/09/2026 – 09/09/2026

UNIT-III: Propulsion

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.	Propeller	1	28-08-2026		TLM1	
14.	Reciprocating Engine, Jet Propulsion	1	31-08-2026		TLM1	
15.	The Thrust Equation, Elements of Turbojet Engine	2	02-09-2026 11-09-2026		TLM1	
16.	Turbofan Engine-Rocket Engine	1	16-09-2026		TLM1	
17.	Rocket Propellants- Liquid Propellants, Solid Propellants	2	18-09-2026 21-09-2026		TLM3	
18.	Rocket Staging	2	23-09-2026 25-09-2026		TLM1	
No. of classes required to complete UNIT-III: 9				**No. of classes taken:**		

UNIT-IV: Flight Vehicle 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
19.	Fuselage-Monocoque, Semi-Monocoque	1	28-09-2026		TLM1	
20.	Components of Wing-Spars, Ribs, Longerons	2	30-09-2026 05-10-2026		TLM1	
21.	Stringers, Bulkheads	1	07-10-2026		TLM1	
22.	Aircraft Materials-Metallic and Non-Metallic Materials	2	09-10-2026 12-10-2026		TLM1	
23.	Use of Aluminium Alloy, Titanium,	2	14-10-2026 16-10-2026		TLM1	
24.	Stainless Steel and Composite Materials.	2	26-10-2026 28-10-2026		TLM1	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Space Flight

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
25.	Orbit Equation, Basic Aspects of Space Vehicle Trajectories	1	30-10-2026		TLM1	
26.	Kepler's Laws, Earth and Planetary Entry,	1	05-11-2026		TLM1	
27.	Space Explorations- Space Vehicles and Its Types	1	07-11-2026		TLM1	
28.	Reusable Space Vehicles, Space Shuttle,	1	07-11-2026		TLM1	
29.	Satellites	1	09-11-2026		TLM1	
30.	Types of Satellites and Their Functions	1	09-11-2026		TLM1	
No. of classes required to complete UNIT-V: 6				**No. of classes taken:**		

Mid 2 Exams: 12/11/2026 – 14/11/2026

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 (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in the Aerospace vehicle design
PSO 2	To prepare the students to work effectively in Aerospace and Allied Engineering organizations

Course Instructor	Module Coordinator	HOD
(Dr. A Revanth Reddy)	(Dr. A Revanth Reddy)	(Dr.P.Lovaraju)

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DEPARTMENT OF AEROSPACE ENGINEERING
Estd.: 1998 Website: https://www.lbrce.ac.in/ase/index.php Email: hodaero@lbrce.ac.in Phone:08659-222933 Ext:624/623

COURSE HANDOUT
PART-A

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

ACADEMIC YEAR : 2026-27

COURSE NAME & CODE : **Engineering Fluid Mechanics-23AE02**

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

COURSE CREDITS : 3

COURSE INSTRUCTOR : **Dr.P.Lovaraju**

Course Objectives:

• To learn the basic concepts of energy conversions, laws of thermodynamics, concept of entropy and properties of pure substances.

• To familiarize basic aspects of gas power cycles and internal combustion engines

Course Outcomes:

COs	Statements	Blooms Level
CO1	Apply fluid static principles on objects submerged in fluids	L3
CO2	Apply the conservation laws to solve elementary fluid flow problems	L3
CO3	Apply the fluid flow principles to simple pipe network for fluid transportation	L3
CO4	Determine the performance of various hydraulic turbines and pumps	L3

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

Course Code	Cos	Program Outcomes												PSOs	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
23AE02	CO1	3	2	2	2	-	-	-	-	-	-	-	2	2	2
	CO2	3	3	3	2	-	-	-	-	-	-	-	2	3	3
	CO3	3	3	3	3	-	-	-	-	-	-	-	2	3	3
	CO4	3	2	3	2	-	-	-	-	-	-	-	2	2	2
1 = Slight (Low)		2 = Moderate (Medium)								3-Substantial(High)					

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

TEXT BOOK

1. Rathakrishnan. E, Fluid Mechanics an Introduction, Fourth Edition, Prentice Hall of India, 2021.
2. Balachandran P, Engineering Fluid Mechanics, Prentice Hall of India, 2012.

REFERENCES

1. White. F.M, Fluid Mechanics, Seventh Edition, McGraw-Hill Education 2011
2. Fox. R.W, Mcdonald, A.J, Introduction of Fluid Mechanics, Fifth Edition, John Wiely, 1999.
3. Douglas. J.F, Gesiorek. J.M., Swaffield. J, A., Fluid Mechanics, Fourth Edition, Pearson Education, 2002.
4. Shames. I.H, Mechanics of Fluids, Third Edition, McGraw-Hill, 1992.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction and Fluid Statics

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 and Overview of the course, Dissemination of course outcomes, General description of Fluid Mechanics, Applications of Fluid Mechanics, Classification of Fluids, Fluids and Continuum	2	14-07-2026 15-07-2026		TLM1	
2.	Properties of Fluid –Pressure, Temperature, Density, Specific Weight, Specific Gravity, Viscosity-Newton's Law of Viscosity	2	16-07-2026 17-07-2026		TLM1	
3.	Compressibility, Surface Tension, Capillarity, Vapor Pressure	1	21-07-2026		TLM1	
4.	Fluid Statics: Pressure Acting at a Point in a Static Fluid-Pascal's Law	1	22-07-2026		TLM1	
5.	Basic Equation of Fluid Statics, Hydrostatic Pressure Distributions	1	23-07-2026		TLM1	
6.	Manometers	2	24-07-2026 28-07-2026		TLM1	
7.	Hydrostatic Pressure Distributions in gases (earth's atmosphere)	1	29-07-2026		TLM1	
8.	Hydrostatic forces on submerged plane surface (derivation)	1	30-07-2026 4-08-2026		TLM1	
9.	Buoyancy and Stability	1	5-08-2026		TLM1	
10.	Tutorial	1	6-08-2026		TLM3	
11.	Assignment/Quiz-1				---	
No. of classes required to complete UNIT-I		**13**		**No. of classes taken:**		

UNIT-II: Analysis of Fluid Flow and Differential Relations for Fluid Flow

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Lagrangian and Eulerian approaches, Flow Patterns- Pathline, Streamline, Streakline, Timeline, Stream Tube	2	7-08-2026 11-08-2026		TLM1, TLM2	
13.	Differential Relations of Fluid Flow: Velocity Field, Acceleration Field of a Fluid	2	12-08-2026 13-08-2026		TLM1	
14.	Differential Equation of Mass Conservation	1	14-08-2026		TLM1	
15.	Stream Function, Velocity Potential Vorticity, Rotationality, Irrotationality	1	18-08-2026		TLM1	
16.	Differential Equation of Linear Momentum, Euler's Equations	1	19-08-2026		TLM1,	
17.	Potential Flow Bernoulli's Equation and its Applications, Orifice Tank	2	20-08-2026 21-08-2026		TLM1, TLM2	
18.	Venturi meter, Pitot-static Tube, Nozzle, Water Siphon and various other applications	2	25-08-2026 27-08-2026		TLM1, TLM2	
19.	Tutorial	1	28-08-2026		TLM3	
20.	Assignment/Quiz-2				----	
No. of classes required to complete UNIT-II		**12**		**No. of classes taken:**		

I MID EXAMINATION	**07-09-2026 to 09-09-2026**

UNIT-III: Flow through Pipes, Dimensional Analysis & Similarity

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
21.	Flow Through Pipes: Reynolds Experiment, Reynolds number	1	1-09-2029		TLM1, TLM4	
22.	Head loss, Darcy-Wiesbach equation, Hydraulic Gradient &Total Energy Lines	2	2-09-2029 3-09-2029		TLM1, TLM2	
23.	Laminar Fully Developed Pipe Flow-Hagen Poiseuille Law	2	10-09-2026 11-09-2026		TLM1	
24.	Pipes in Series, Pipes in Parallel	1	15-09-2026		TLM1, TLM2	
25.	Equivalent Pipe, Hydraulic Diameter, Minor Losses, Moody Chart and its usage	1	16-09-2026		TLM1	
26.	Introduction, Principle of Dimensional Homogeneity,	1	17-09-2026		TLM1	
27.	Buckingham's Pi Theorem	1	18-09-2026		TLM1	
28.	Dimensionless Groups, Similarity	1	22-09-2026		TLM1	
29.	Tutorial	1	23-09-2026		TLM3	
30.	Assignment/Quiz-3					
No. of classes required to complete UNIT-III		**11**		**No. of classes taken:**		

UNIT-IV: Hydraulic Turbines

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.	Introduction, Classification of turbines- Hydro-electric power plants impulse and reaction turbines,	2	24-09-2026 25-09-2026		TLM1	
32.	Pelton Turbine working principle	1	29-09-2026		TLM1, TLM5	
33.	Velocity triangles, Work done, Efficiency,	2	30-09-2026 1-10-2026		TLM1	
34.	Francis Turbine, working principle,	1	6-10-2026		TLM1	
35.	Velocity triangles, Work done and Efficiency	1	7-10-2026			
36.	Kaplan Turbine, working principle, Velocity triangles, Work done and Efficiency	1	8-10-2026		TLM1	
37.	Draft Tube and its theory, surge tank	1	9-10-2026		TLM1	
38.	Unit and specific quantities	1	13-10-2026		TLM1	
39.	Tutorial	1	14-10-2026		TLM3	
40.	Assignment/Quiz-4					
No. of classes required to complete UNIT-IV		11		**No. of classes taken:**		

UNIT-V: Centrifugal Pumps and Reciprocating Pumps

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Centrifugal Pumps: Classification, Working Principle, Constructional Details	2	15-10-2026 16-10-2026		TLM1, TLM5	
42.	Velocity Triangles, Work done, Head and Efficiencies	2	26-10-2026 27-10-2026		TLM1	
43.	Losses, Specific Speed, Pumps in Series and Parallel	2	28-10-2026 29-10-2026		TLM1, TLM5	
44.	Reciprocating Pumps: Classification, Working Principle	2	30-10-2026 3-11-2026		TLM1	
45.	Co-efficient of Discharge and Slip, Indicator Diagram	1	4-11-2026		TLM1	
46.	Tutorial -5	1	5-11-2026		TLM3	
47.	Assignment/Quiz-5					
No. of classes required to complete UNIT-V		**10**		**No. of classes taken:**		

S.No.	Topics to be covered	Dates	TLM
1.	**Revision**	6-11-2026 10-11-2026	TLM2
2.	Turbulent flows	11-11-2026	TLM2

Mid-2	12-11-2026 to 14-11-2026

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (lab or 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

PART-D

PROGRAM 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 Investigation 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 predictions 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 Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

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

Course Instructor	**Module Coordinator**	**HOD**

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DEPARTMENT OF AEROSPACE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: **Mr.I.Dakshina Murthy / Mr. A.Pratyush**

Course Name & Code **:** Engineering Thermodynamics (23AE03) **Regulation**: R23

L-T-P Structure **: 3-1-0** **Credits:** 3

Program/Sem/Sec : B.Tech/III/-- **A.Y.:** 2026-2027

PREREQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): To learn the basic concepts of energy conversions, laws of thermodynamics, concept of entropy, the properties of different gas mixtures and pure substances and basic aspects of ideal thermal cycles.

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

CO1	Describe the thermodynamic properties of various systems (Understand-L2)
CO2	Apply the laws of thermodynamics to analyze various thermal systems. (Apply-L3)
CO3	Understand the properties of pure substances (Understand-L2)
CO4	Formulate performance parameters of various gas power cycles. (Apply-L3)
CO5	Describe the working of Internal Combustion Engines. (Understand-L2)

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	2	3	-	-	-	-	-	-	-	3	3	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO3	3	3	3	2	-	-	-	-	-	-	-	3	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO5	2	3	3	3	-	-	-	-	-	-	-	3	3	3
1 - Low **2 –**Medium **3 -** High														

TEXTBOOKS:

T1 Rathakrishnan. E, Fundamentals of Engineering Thermodynamics, Second Edition, Prentice Hall of India, 2010

REFERENCE BOOKS:

R1 Nag. P.K, Engineering Thermodynamics- Fifth Edition, McGraw-Hill, 2013.

R2 Cengel. Y.A and Boles, M.A, Thermodynamics: An Engineering Approach, Seventh Edition, McGraw-Hill, 2011.

R3 Sonntag. R. E, Borgnakke. C, Van Wylen. G. J, Fundamentals of Thermodynamics, Fifth Edition John Wiley & sons, publications Inc, 1998.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: BASIC CONCEPTS AND DEFINITIONS

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.	**Basic Concepts and Definitions:** Introduction	1	15-07-2026		TLM 1	
2.	Macroscopic and Microscopic View Point, Thermodynamic system, Continuum, System, Control Volume, Properties of System	1	16-07-2026		TLM 1	
3.	State and Equilibrium, Thermodynamic Equilibrium	1	17-07-2026		TLM 1	
4.	**Tutorial – I**	1	18-07-2026		TLM 3	
5.	Process- Quasi static process-Cycle	1	22-07-2026		TLM 1	
6.	Temperature -Temperature scales, Problems	1	23-07-2026		TLM 1	
7.	Zeroth law of Thermodynamics, energy-forms of energy.	1	24-07-2026		TLM 1	
8.	**Tutorial – II**	1	25-07-2026		TLM 3	
9.	Heat and work	1	29-07-2026		TLM 1 &2	
10.	Mechanical forms of work	1	30-07-2026		TLM 1 &2	
11.	Work done in various non-flow process	1	31-07-2026		TLM 1 &2	
12.	Problems on Pdv Work	1	05-08-2026		TLM 1 &2	
13.	Problems on Pdv Work, Path and point function	1	06-08-2026		TLM 1 &2	
14.	**Tutorial - III**	1	07-08-2026		TLM 3	
15.	Revision & Summary	1	08-08-2026		TLM 1	
No. of classes required to complete UNIT-I: 15				**No. of classes Taken:**		

UNIT-II: FIRST LAW OF THERMODYNAMICS & ITS ANALYSIS OF CONTROL VOLUME

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	**First Law of Thermodynamics**: Introduction	1	12-08-2026		TLM 1	
17.	Joule's Experiment	1	13-08-2026		TLM 1 &2	
18.	First Law Analysis of closed system.	1	14-08-2026		TLM 1 &2	
19	Different Forms of Stored Energy	1	19-08-2026		TLM 1 &2	
20	**Tutorial – IV**	1	20-08-2026		TLM 3	
21	Energy balance, Internal energy, specific Heat.	1	21-08-2026		TLM 1 &2	
22	Enthalpy, PMM-I, Principle flow work.	1	22-08-2026		TLM 1 &2	
23	Conservation of Energy & mass, Flow Work, Problems on First law applied to closed system	1	27-08-2026		TLM 1 &2	
24	**First law analysis of control volume-** The Steady Flow Process, Steady Flow EnergyEquation	1	28-08-2026		TLM 1 &2	

25	**Tutorial – V**	1	29-08-2026		TLM 3	
26	Steady flow engineering devices-Nozzle, Turbine	1	02-09-2026		TLM 1 &2	
27	Compressor, Heat Exchanger	1	03-09-2026		TLM 1 &2	
28	Problems on Steady Flow Devices	1	05-09-2026		TLM 1 &2	
No. of classes required to complete UNIT-II: 13				**No. of classes Taken:**		

UNIT-III: SECOND LAW OF THERMODYNAMICS & ENTROPY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
29	**Second law of thermodynamics** :Introduction, Thermal energy reservoirs, heat engines	1	10-09-2026		TLM 1	
30	Kelvin-Planks, Clausius statement of second law of thermodynamics, Refrigerator, heat pumps,	1	11-09-2026		TLM 1	
31	Equivalence of kelvin-plank and clausius statements, Perpetual motion machines, reversible and irreversible process	1	12-09-2026		TLM 2	
32	**Tutorial – VI**	1	16-09-2026		TLM 3	
33	Carnot cycle, Carnot principles, Corollary of Carnot Theorem, Absolute Thermodynamic Temperature Scale, the Carnot heat engine.	1	17-09-2026		TLM 1	
34	Problems	1	18-09-2026		TLM 1 &2	
35	**Entropy**: Introduction, Clausius inequality, property diagrams, Max well Relation.	1	19-09-2026		TLM 1 &2	
36	**Tutorial - VII**	1	23-09-2026		TLM 3	
37	Entropy change forcompressible and incompressible substances, Isentropic relations for ideal gases, Principle of increase of Entropy, TD third law.	1	24-09-2026		TLM 1 &2	
No. of classes required to complete UNIT-III: 09			**No. of classes Taken:**			

UNIT-IV: PROPERTIES OF PURE SUBSTANCES & GAS POWER CYCLES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36	**Pure substance**: Introduction, phase of pure substance, Phase change processes, property diagrams	1	25-09-2026		TLM 1 &2	
37	P-V-T surface, property tables	1	26-09-2026		TLM 1 &2	
38	h-s Diagram or Mollier Diagram for pure Substance	1	30-09-2026		TLM 1 &2	
39	Dryness Fraction-Saturated Liquid Vapor Mixture.	1	01-10-2026		TLM 1 &2	
40	**Tutorial – VIII**	1	03-10-2026		TLM 3	
41	Problems on Pure Substances	1	07-10-2026		TLM 1 &2	
42	Gas power cycles-Introduction, Analysis of power cycles- Carnot, Air-standard Assumptions.	1	08-10-2026		TLM 1 &2	
43	Analysis of Otto cycle	1	09-10-2026		TLM 1 &2	

44	Analysis of Diesel, Dual cycle	1	14-10-2026		TLM 1 &2	
45	Analysis of Brayton Cycle, Problems on gas power cycles	1	15-10-2026		TLM 1 &2	
No. of classes required to complete UNIT-IV: 10			**No. of classes Taken:**			

UNIT-V: INTERNAL COMBUSTION ENGINES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
46	Classification of IC Engines, Components of IC engines	1	16-10-2026		TLM 1 &2	
47	Working of 4-stroke and 2-stroke engines	1	17-10-2026		TLM 1 &2	
48	Principles of Spark Ignition (SI) Engine	1	28-10-2026		TLM 1 &2	
49	Compression Ignition (CI) Engine	1	29-10-2026		TLM 1 &2	
50	**Tutorial – IX**	1	30-10-2026		TLM 3	
51	Valve and Port Timing Diagrams	1	31-10-2026		TLM 1 &2	
52	Air-fuel Mixture, Carburation	1	04-11-2026		TLM 3	
53	Performance Analysis of IC engines.	1	05-11-2026		TLM 1 &2	
54	Performance Analysis of IC engines. Problems	1	06-11-2026		TLM 1 &2	
55	Revision	1	07-11-2026		TLM 1 &2	
56	Revision & Concluding Remarks	1	11-11-2026		TLM 1 &2	
No. of classes required to complete UNIT-V: 11			**No. of classes Taken:**			

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

PART-C

EVALUATION PROCESS (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 EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To provide students with sound mathematical, engineering and multidisciplinary knowledge to solve Aerospace and Allied Engineering problems
PEO 2	To prepare students to excel in higher education programs and to succeed in industry/academia profession.
PEO 3	To inculcate ethical attitude, leadership qualities, problem solving abilities and life-long learning for a successful professional career

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in the Aerospace vehicle design
PSO 2	To prepare the students to work effectively in Aerospace and Allied Engineering organizations

Title	**Course Instructor**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr.I.Dakshina Murthy**	**Mr.I.Dakshina Murthy**	**Dr.P.Lovaraju**
Signature			

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
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FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM	**:** II B. Tech., III-Sem., ASE
ACADEMIC YEAR	**:** 2026-27
COURSE NAME & CODE	**: Environmental Science**
L-T-P STRUCTURE	**:** 2-0-0
COURSE CREDITS	**:** 0
COURSE INSTRUCTOR	**:** Dr. V. Bhagya Lakshmi.
COURSE COORDINATOR	**:** Dr. Shaheda Niloufer
PRE-REQUISITES	**:** Biology, Chemistry, Geology, Mathematics or Physics

Course Objectives:

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

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

CO 1	The necessity of resources, their exploitation and sustainable management	L2
CO 2	The interactions of human and ecosystems and their role in the food web in the natural world and the global biodiversity, threats to biodiversity and its conservation.	L2
CO 3	Environmental problems like pollution, disasters and possible solutions.	L1
CO 4	The importance of environmental decision making in organizations through understanding the environmental law and environmental audits.	L2
CO 5	Environmental issues like over population, human health etc related to local, regional and global levels.	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	3	3	-	-	-	3	3	3	-	-	-	3	-	-	-
CO2	3	3	-	-	-	3	3	-	-	-	-	3	-	-	-
CO3	3	-	3	-	-	-	2	-	-	-	-	2	-	-	-
CO4	3	-	-	-	-	2	3	2	-	-	-	3	-	-	-
CO5	3	3	3	3	-	3	3	3	-	-	-	3	-	-	-

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

BOS APPROVED TEXT BOOKS:

T1. Erach Bharucha, Text book of Environmental Studies for Undergraduate Courses, Universities Press (India) Private Limited, 2019.

T2. Palaniswamy, Environmental Studies,2/e, Pearson education,2014.

T3. S. Azeem Unnisa, Environmental Studies, Academic Publishing Company,2021.

T4. K. Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", SciTech Publications (India), Pvt. Ltd, 2010.

Reference Books:

R1. KVSG Murali Krishna, The Book of Environmental Studies, 2/e, VGS Publishers, 2011.

R2. Deeksha Daveand E. Sai Baba Reddy, Text book of Environmental Science,2/e, Cengage Publications, 2012.

R3. M. Anji Reddy, "Text book of Environmental Sciences and Technology", B S Publication, 2014.

R4. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications,2006.

R5. J. Glynn Henryand GaryW. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.

R6. G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.

R7. Gilbert M. Masters and Wendell P. Ela, Introduction to Environmental Engineering and Science,1/e, Prentice Hall of India Private limited, 1991.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the course	1	14-07-2026		TLM2			
2.	Multidisciplinary Nature of Environmental Studies	1	15-07-2026		TLM2			

UNIT-I: Multidisciplinary Nature of Environmental Studies

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
3.	Natural Resources – Forest resources	1	21-07-2026		TLM1	CO1	T1,T2	
4.	Water resources	1	22-07-2026		TLM2	CO1	T1,T2	
5.	Mineral resources	1	28-07-2026		TLM1	CO1	T1,T2	
6.	Food resources	1	29-07-2026		TLM2	CO1	T1,T2	
7.	Energy resources	1	04-08-2026		TLM2			
No. of classes required to complete UNIT-I		06			No. of classes taken:			

UNIT-II: Ecosystems and Biodiversity

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.	Ecosystems – Structure & Functions	1	05-08-2026		TLM4	CO2	T1,T2	
9.	Ecological succession &	1	11-08-2026		TLM1	CO2	T1,T2	
10.	Food chains, Food webs & Ecological Pyramids	1	12-08-2026		TLM4	CO2	T1,T2	
11.	Types of ecosystems	1	18-08-2026		TLM1	CO2	T1,T2	

12.	Biodiversity – introduction, levels, bio geographic classification	1	19-08-2026		TLM2	CO2	T1,T2	
13.	Values of Biodiversity, India as mega diversity nation,	1	25-08-2026		TLM2	CO2	T1,T2	
14.	Threats to biodiversity and Conservation of biodiversity		01-09-2026					
15.	Revision		02-09-2026					
No. of classes required to complete UNIT-II		08			No. of classes taken:			

I MID EXAMINATIONS (07-09-2026 TO 09-09-2026)

UNIT-III: Environmental Pollution

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
16.	Environmental pollution -Air pollution	1	15-09-2026		TLM1	CO3	T1,T2	
17.	Water pollution, Marine pollution, Thermal pollution	1	16-09-2026		TLM1	CO3	T1,T2	
18.	Soil pollution	1	22-09-2026		TLM1	CO3	T1,T2	
19.	Solid waste management	1	23-09-2026		TLM1	CO3	T1,T2	
20.	Disaster management	1	29-09-2026		TLM1	CO3	T1,T2	
No. of classes required to complete UNIT-III		06			No. of classes taken:			

UNIT-IV: Social Issues and Environment

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.	From Unsustainable to Sustainable development	1	30-09-2026		TLM1	CO4	T1,T2	
22.	Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns	1	06-10-2026		TLM1	CO4	T1,T2	
23.	Environmental ethics, Climate change	1	07-10-2026		TLM6	CO4	T1,T2	
24.	Carbon credits & Mission LiFE - Wasteland reclamation. – Consumerism and waste products	1	13-10-2026		TLM1	CO4	T1,T2	
25.	Environmental Acts	1	14-10-2026		TLM1	CO4	T1,T2	
26.	Environmental Acts	1	27-10-2026		TLM1	CO4	T1,T2	
No. of classes required to complete UNIT-IV		06			No. of classes taken:			

UNIT-V: Human Population & Environment

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
27.	Population growth, variation among nations. Population explosion – Family Welfare Programmes.	1	28-10-2026		TLM1	CO5	T1,T2	
28.	Environment and human health –Human Rights – Value Education	1	03-11-2026		TLM1	CO5	T1,T2	
29.	HIV/AIDS – Women and Child Welfare	1	04-11-2026		TLM1	CO5	T1,T2	
30.	Role of information Technology in Environment and human health	1	10-11-2026		TLM1	CO5	T1,T2	
31.	Revision	1	11-11-2026		TLM3	CO5	T1,T2	
No. of classes required to complete UNIT-V		06			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
32.	Awareness on ozone layer Case studies	1	19-09-2026		TLM2	CO2	T1,T2	
II MID EXAMINATIONS (12-11-2026 TO 14-11-2026)								

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 (R23 Regulation):

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

PART-D PROGRAMME OUTCOMES (POs):

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

Dr. V. Bhagya Lakshmi	**Dr. Shaheda Niloufer**	**Dr. Shaheda Niloufer**	**Dr. T. Satyanarayana**
Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

L. B. Reddy Nagar, Mylavaram – 521 230, N.T.R. District, Andhra Pradesh, India
Affiliated to JNTUK, Kakinada & Approved by AICTE New Delhi
Accredited by NBA (Tier – I) and NAAC with 'A' grade,
An ISO 21001:2018, 500001:2018, 14001:2015 Certified Institution

DEPARTMENT OF AEROSPACE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor	**: Dr. P. Ravindra Kumar/Dr. Sreenadh Chevula**	
Course Name & Code	**: Engineering Fluid Mechanics Lab (23AE51)**	**Regulation: R23**
L-T-P Structure	**: 0-0-3**	**Credits: 1.5**
Program/Sem/Sec	**: B.Tech/III-SEM**	**A.Y.: 2026-27**

Course Objective:

1. To learn about the insights of calculating the discharge in various flow measuring devices
2. To work on performance parameters of hydraulic machines

Course Outcomes: At the end of the semester, the student will be able to

CO1: Apply the principles of fluid mechanics in discharge measuring devices used in pipes, channels and tanks (Apply – L3)

CO2: Analyze performance of various hydraulic machines (Analyze-L4)

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	-	3	-	-	-	-	1	-	-	2	2	2
CO2	2	3	2	3	-	-	-	-	1	-	-	2	2	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).

References: Engineering Fluid Mechanics Lab Manual

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
		BATCH-A			**BATCH-B**			
1.	Introduction	03	13-07-26		16-07-26		TLM4	
2.	Exp No 1	03	20-07-26		23-07-26		TLM4	
3.	Exp No 2	03	27-07-26		30-07-26		TLM4	
4.	Exp No 3	03	03-08-26		06-08-26		TLM4	
5.	Exp No 4	03	10-08-26		13-08-26		TLM4	
6.	Exp No 5	03	17-08-26		20-08-26		TLM4	
7.	Repeat & Viva-voce	03	24-08-26		27-08-26		TLM4	
8.	Additional Experiment	03	31-08-26		03-09-26		TLM4	
9.	Exp No 6	03	10-09-26		17-09-26		TLM4	
10.	Exp No 7	03	21-09-26		24-09-26		TLM4	
11.	Exp No 8	03	28-09-26		01-10-26		TLM4	
12.	Exp No 9	03	05-10-26		08-10-26		TLM4	
13.	Exp No 10	03	12-10-26		15-10-26		TLM4	
14.	Repetition/ Additional Experiment	03	26-10-26		29-10-26		TLM4	
15.	Internal Exam	03	02-11-26		05-11-26		TLM4	
No. of classes required to complete:13						**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Expt. No's	Marks
Day to Day work (**A)**	1,2,3,4, ……, 10	**A=05**
Record (**B)**	1,2,3,4, ……, 10	**B=05**
Viva-voce **(C)**	1,2,3,4, ……, 10	**C=05**
Internal Test **(D)**	1,2,3,4, ……, 10	**D=15**
Cumulative Internal Examination: (A+B+C+D)	1,2,3,4, ……, 10	**30**
Semester End Examinations (E)	1,2,3,4, ……, 10	**E=70**
Total Marks: (A + B + C + D + E)	1,2,3,4, ……, 10	**100**

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To provide students with sound mathematical, engineering, and multidisciplinary knowledge to solve Aerospace and Allied Engineering problems.
PEO 2	To prepare students to excel in higher education programs and to succeed in industry/academia profession.
PEO 3	To inculcate ethical attitude, leadership qualities, problem solving abilities and life-long learning for a successful professional career.

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in the Aerospace vehicle design.
PSO 2	To prepare the students to work effectively in Aerospace and Allied Engineering organizations.

Title	**Course Instructors**	**Module Coordinator**	**Head of the Department**
Signature			
Name of the Faculty	**Dr. P. Ravindra Kumar/ Dr. Sreenadh Chevula**	Dr. P. Lovaraju	Dr. P. Lovaraju

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF AEROSPACE ENGINEERING

TIME TABLE

Name of Course Instructor: Mr. I Dakshina Murthy / Mr. A. Pratyush

Course Name & Code : Applied Thermodynamics Lab- 23AE52 **Regulation**: R23

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

Program/Sem/Sec : B.Tech/III-SEM **A.Y.:** 2026-27

DAY	1	2	3	LUNCH	5	6	7
	9:00 to 10:00	10:00 to 11:00	11.00 to 12:00		01:00 to 02:00	02:00 to 03:00	03:00 to 04:00
MON					-------- ATD Lab (Batch B) -------		
TUE							
WED							
THU					------- ATD Lab (Batch A) ------		
FRI							
SAT							

LAB IN-CHARGE **HOD**

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DEPARTMENT OF AEROSPACE ENGINEERING

Batch Division

Name of Course Instructor: Mr. I Dakshina Murthy / Mr. A. Pratyush
Course Name & Code : Applied Thermodynamics Lab- 23AE52 **Regulation**: R23
L-T-P Structure : **0-0-3** **Credits:** 1.5
Program/Sem/Sec : B.Tech/III-SEM **A.Y.:** 2026-27

SECTION	ROLL NUMBERS	TOTAL NO OF STUDENTS
BATCH -A	24761A5617,25761A5601 to 632	33
BATCH -B	25761A5633 to 666	33

BATCH:A	BATCH:B
A_1 ----24761A5617,25761A5601, 02, 03, 04,05	B_1 ----25761A5633,34,35,36,37,38
A_2 -----25761A5606,07,08, 09,10,11	B_2 ---- 25761A5639,40,41,42,43,44
A_3 -----25761A5612,13,14, 15,16,17,18	B_3 ---- 25761A5645,46,47,48,49,50,51
A_4 ----- 25761A5619,20,21,22,23,24,25	B_4 ----25761A5652,53,54,55,56,57,58
A_5 ----- 25761A5626,27,28,29,30,31,32	B_5 –-- 25761A5659,61,62,63,64,65,66

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DEPARTMENT OF AEROSPACE ENGINEERING

CYCLE SCHEDULE - BATCH -A

Name of Course Instructor: Mr. I Dakshina Murthy / Mr. A. Pratyush

Course Name & Code : Applied Thermodynamics Lab- 23AE52 **Regulation**: R23

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

Program/Sem/Sec : B.Tech/III-SEM **A.Y.:** 2026-27

I CYCLE SCHEDULE - BATCH -A

Scheduled Date	Actual Date/Exp. No	A-I	A-II	A-III	A-IV	A-V
16-07-2026		Introduction				
23-07-2026		E1	E2	E3	E4	E5
30-07-2026		E2	E3	E4	E5	E1
06-08-2026		E3	E4	E5	E1	E2
13-08-2026		E4	E5	E1	E2	E3
20-08-2026		E5	E1	E2	E3	E4

II CYCLE SCHEDULE- BATCH -A

Scheduled Date	Actual Date/Exp. No	A-I	A-II	A-III	A-IV	A-V
10-09-2026		E6	E7	E8	E9	E10
17-09-2026		E7	E8	E9	E10	E6
24-09-2026		E8	E9	E10	E6	E7
01-10-2026		E9	E10	E6	E7	E8
08-10-2026		E10	E6	E7	E8	E9

LAB IN-CHARGE

HOD

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DEPARTMENT OF AEROSPACE ENGINEERING

CYCLE SCHEDULE - BATCH -B

Name of Course Instructor: Mr. I Dakshina Murthy / Mr. A. Pratyush

Course Name & Code : Applied Thermodynamics Lab- 23AE52 **Regulation**: R23

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

Program/Sem/Sec : B.Tech/III-SEM **A.Y.:** 2026-27

I CYCLE SCHEDULE - BATCH -B

Scheduled Date	Actual Date/Exp. No	B-I	B-II	B-III	B-IV	B-V
13-07-2026		Introduction				
20-07-2026		E1	E2	E3	E4	E5
27-07-2026		E2	E3	E4	E5	E1
03-08-2026		E3	E4	E5	E1	E2
10-08-2026		E4	E5	E1	E2	E3
17-08-2026		E5	E1	E2	E3	E4

II CYCLE SCHEDULE- BATCH -B

Scheduled Date	Actual Date/Exp. No	B-I	B-II	B-III	B-IV	B-V
21-09-2026		E6	E7	E8	E9	E10
28-09-2026		E7	E8	E9	E10	E6
05-10-2026		E8	E9	E10	E6	E7
12-10-2026		E9	E10	E6	E7	E8
26-10-2026		E10	E6	E7	E8	E9

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DEPARTMENT OF AEROSPACE ENGINEERING

Experiment Schedule

Name of Course Instructor: Mr.I.Dakshina Murthy /Mr.A.Pratyush

Course Name & Code : Applied Thermodynamics Lab-23AE52 **Regulation**: R23

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

Program/Sem/Sec : B.Tech/III-SEM **A.Y.:** 2026-27

I Cycle Schedule (ATD LAB): BATCH- A & B

S. No.	Batch 'A' Dates	Batch 'B' Dates	Exp. No.	Experiment Name
1	16-07-2026	13-07-2026	--	Introduction to the Lab
2	23-07-2026	20-07-2026	E1	I.C Engines valve
3	30-07-2026	27-07-2026	E2	Port timing diagrams
4	06-08-2026	03-08-2026	E3	Determination of viscosity of fuel by using viscometer.
5	13-08-2026	10-08-2026	E4	Performance Test on single cylinder 4-Stroke Diesel engine by using Mechanical Dynamometer.
6	20-08-2026	17-08-2026	E5	Evaluation of performance parameters of twin cylinder 4-stroke Diesel engine.
7	27-08-2026	24-08-2026	-	Repeat
8	03-09-2026	31-08-2026	-	Viva-voce

II Cycle Schedule (ATD LAB): BATCH- A & B

S. No.	Batch 'A' Dates	Batch 'B' Dates	Exp. No.	Experiment Name
7	10-09-2026	21-09-2026	E6	Evaluation of engine friction power by conducting Morse test on Multi cylinder 4-Stroke Diesel Engine
8	17-09-2026	28-09-2026	E7	Preparation of Heat Balance Sheet for 4 stroke Diesel engine
9	24-09-2026	05-10-2026	E8	Performance Test on Reciprocating Air–Compressor.
10	01-10-2026	12-10-2026	E9	Determination of performance characteristics of 2-Stroke Petrol Engine
11	08-10-2026	26-10-2026	E10	Determination of calorific value of fuel using bomb calorimeter.
12	15-10-2026	02-11-2026	-	Repeat
13	29-10-2026	09-11-2026	-	Internal Exam & Viva-voce
14	05-11-2026	-	-	Internal Exam & Viva-voce

LAB IN-CHARGE **HOD**

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DEPARTMENT OF AEROSPACE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : K. LAKSHMI DEVI
Course Name & Code : PYTHON PROGRAMMING LAB (23CS57)
L-T-P Structure : 0-0-2 Credits : 1
Program/Sem/Sec : B.Tech., ASE., III-Sem. A.Y : 2026-27
PRE-REQUISITE : C Programming

COURSE EDUCATIONAL OBJECTIVES (CEOs):

1. Fundamental Understanding: Develop a solid foundation in Python programming, covering essential syntax, semantics, and constructs.
2. Data Manipulation: Equip students with skills to handle and manipulate data using Python libraries like Pandas and NumPy.
3. Problem-Solving: Enhance problem-solving abilities by implementing various algorithms and data structures in Python.
4. Software Development: Foster software development skills, including version control, package management, and project documentation.
5. Advanced Techniques: Introduce advanced Python topics such as web scraping, API interaction, and database management.

COURSE OUTCOMES (COs): At the end of the course, students are able to

CO 1	Solve the different methods for linear, non-linear and differential equations. (Evaluate)
CO 2	Learn the PYTHON Programming language. (Remember)
CO 3	Familiar with the strings and matrices in PYTHON (Remember)
CO 4	Write the Program scripts and functions in PYTHON to solve the methods (Create)
CO 5	Evaluate different methods of numerical solutions (Evaluate)

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	3	2	-	-	-	-	-	-	-
CO3	-	3	2	3	2	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	2	2	2	-	-
CO5	-	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).

PART-B

Experiment-1: Introduction to Python

a) Install Python and an IDE(e.g Pycharm , VSCode, or Jupiter Notebook)

b) Implement Python Script to print "Hello world".

Experiment-2: Language basics and example problems (Two weeks)

c) Implement Python Script for checking the given year is leap year or not.

d) Implement Python Script for finding biggest number among 3 numbers.

e) Implement Python Script for displaying reversal of a number.

f) Implement Python Script to check given number is Armstrong or not.

g) Implement Python Script to print sum of N natural numbers.

h) Implement Python Script to check given number is palindrome or not.

i) Implement Python script to print factorial of a number.

j) Implement Python Script to print all prime numbers within the given range.

Experiment-3: Exercise Programs on functions and Modules.

a) Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.

b) Write a program which makes use of function to display all such numbers which are divisible by 7 but are not a multiple of 5, between given range X and Y.

c) Define functions to find mean, median, mode for the given numbers in a list.

d) Define a function which generates Fibonacci series up to n numbers.

e) Implement a python script for factorial of number by using recursion.

f) Implement a python script to find GCD of given two numbers using recursion.

Experiment-4: Exercise Programs on Lists and Tuples.

a) Write a Python script to display elements of list in reverse order.

b) Write a Python script to find the minimum and maximum elements without using built-in operations in the lists.

c) Write a Python script to remove duplicates from a list.

d) Write a Python script to append a list to the second list.

e) Write a Python script to count the number of strings in a list where the string length is 2 or more.

f) Write a Python script to create a tuple with different data types.

g) Write a Python script to find the repeated items of a tuple.

h) Write a Python script to replace last value of tuples in a list.
Sample list: [(10, 20, 40), (40, 50, 60), (70, 80, 90)]
Expected Output: [(10, 20, 100), (40, 50, 100), (70, 80, 100)]

i) Write a Python script to sort a tuple by its float element.
Sample data: [('item1', '12.20'), ('item2', '15.10'), ('item3', '24.5')]
Expected Output: [('item3', '24.5'), ('item2', '15.10'), ('item1', '12.20')]

Experiment-5: Exercise Programs on Sets and Dictionaries.

a) Write a Python script to add member(s) in a set.
b) Write a Python script to perform Union, Intersection, difference and symmetric difference of given two sets.
c) Write Python script to test whether every element in S is in T and every element in T is in S.
d) Write a Python script to sort (ascending and descending) a dictionary by value.
e) Write a Python script to check whether a given key already exists or not in a dictionary.
f) Write a Python script to concatenate following dictionaries to create a new one.
Sample Dictionary : dic1={1:10, 2:20} dic2={3:30, 4:40} dic3={5:50,6:60}
Expected Result : {1: 10, 2: 20, 3: 30, 4: 40, 5: 50, 6: 60}
g) Write a Python script to print a dictionary where the keys are numbers between 1 and 15 (both included) and the values are square of keys.
h) Write a Python program to map two lists into a dictionary.

Experiment-6: Exercise programs on Strings and File I/O

a) Implement Python Script to perform various operations on string using string libraries.
b) Implement Python Script to check given string is palindrome or not.
c) Implement python script to accept line of text and find the number of characters, number of vowels and number of blank spaces in it.
d) Implement python script that takes a list of words and returns the length of the longest one.

Experiment-7: Exercise programs on Error Handling and Exception

a) Write a Python script to using try, except , else and finally
b) Handle specific exceptions
c) Create and custom raise exceptions

Experiment-8: Exercise programs on Object Oriented Programming (OOP)

a) Implement Python Script to using classes and objects.
b) Implement Python Script to inheritance and polymorphism.
c) Implement Python Script class and Instance variables .

Experiment-9 & 10 : Exercise programs on Libraries and packages :Pandas, Numpy, Matplotlib

a) Write a Python program to draw a line with suitable label in the X axis, Y axis and a title.

b) Write a Python program to plot two or more lines with legends, different widths and colors.
c) Write a Python program to create multiple plots.
d) Write a Python programming to display a bar chart using different color for each bar.
e) Write a Python programming to create pie chart with a title.
f) Write a Python programming to draw a scatter plot with empty circles taking a random distribution in X and Y and plotted against each other

Experiment-11 & 12 : Exercise programs on Web scrapping, Databases and APIs

a) Write a Python script to access and parse data from RESTful APIs
b) Process and analyze JSON data from APIs
c) Connect to a database using SQLite and SQL Alchemy
d) CRUD Operations on the database.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Programs to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	**Experiment-1:** Installation and Working on Interpreter Language Basics and Example Programs	3	17.07.2026		TLM4	CO1,CO4	
2.	**Experiment-2 :**Basic programs	3	17.07.2026		TLM4	CO1,CO4	
3.	**Experiment 3-** Programs on Functions and Modules	3	24.07.2026		TLM4	CO1,CO4	
4.	**Experiment-4** Programs on Lists & Tuples	3	31.07.2026		TLM4	CO2,CO4	
5	**Experiment-4** Programs on Lists & Tuples	3	07.08.2026		TLM4	CO2,CO4	
5.	**Experiment-5** Programs on Sets & Dictionaries	3	14.08.2026		TLM4	CO2,CO4	
6.	**Experiment-5** Programs on Sets & Dictionaries	3	21.08.2026		TLM4	CO2,CO4	
1st MID Examinations							
7.	**Experiment-6** Programs on Strings and File I/O	3	28.08.2026		TLM4	CO3,CO4	
8.	**Experiment-7** Error Handling and Exceptions	3	11.09.2026		TLM4	CO3,CO4	
9.	**Experiment-8** Exercise programs on OOPS	3	18.09.2026		TLM4	CO3,CO4	

10.	**Experiment-9** Exercise programs on Matplotlib Library, Pandas, Numpy	3	25.09.2026		TLM4	CO3,CO4	
11.	**Experiment-10** Exercise programs on Matplotlib Library, Pandas, Numpy	3	09.10.2026		TLM4	CO3,CO4	
12.	**Experiment-11** Exercise programs on Web scraping and APIs	3	16.10.2026		TLM4	CO3,CO4	
13.	**Experiment-12** Exercise programs on SQLite quires and connections to database	3	30.10.2026		TLM4	CO4,CO5	
14.	Internal Lab Exam	3	06.11.2026				

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 (R23 Regulation): for LABORATORY COURSES

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

PART-D

PROGRAMME OUTCOMES (POs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Mrs. K. Lakshmi Devi**	**Mrs. K. Lakshmi Devi**	**Dr. K. Phaneendra**	**Dr. P.Lovaraju**
Signature				

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Estd.: 1998
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COURSE HANDOUT

PART-A

Name of Course Instructor:	**: Mr. G V Surya Narayana/Mr. A. Pratyush/ Mr. S. Indrasena Reddy (T561)**	**A.Y.:** 2026-27
Course Name &	**:** Computer-Aided Design Lab-Skill Enhancement Course	**Code:** 23AES1
L-T-P Structure	**:** 0-1-2	**Credits:** 2
Program/Sem/Sec	**:** B. Tech/ASE/II Year-I Sem	**Regulation:** R23

Course Objective:

- The course aims to teach developing and drawing Machine components using AutoCAD.
- To teach the students fundamentals of AutoCAD.
- To learn 2-D, Isometric and 3-D Component Designs.

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

COs	Statements	Blooms Level
CO1	Draw simple objects using functional tools in AutoCAD	**Understand**
CO2	Create solid models of machine and Simple Aircraft components.	**Apply**
CO3	Translate 3D components into 2D drawings.	**Apply**

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

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

Si. No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	CYCLE-I					
1.	Introduction to AUTOCAD	3+1	18-07-2026		TLM1, TLM4	
2.	Basic AUTOCAD Commands: Basic drawing commands (line, circle, arc, ellipse, polygon, and rectangle).	3+1	25-07-2026		TLM1, TLM4	
3.	Edit commands (copy, move, erase, zoom).	3+1	01-08-2026		TLM1, TLM4	
4.	Array commands (polar array, rectangular array, P-edit, divide, plane, offset).	3+1	08-08-2026		TLM1, TLM4	
5.	Hatching &line commands (hatching with different angles& different types of lines).	3+1	22-08-2026		TLM1, TLM4	
6.	Mirror & trim commands (mirror an object, trim, extend a line, chamfer & fillet, explode).	3+1	29-08-2026		TLM1, TLM4	
7.	Dimensioning & text commands (linear, angular, radius, diameter& text). 2-D Drawings of Machine Components	3+1	05-09-2026		TLM1, TLM4	
	CYCLE-II					
8.	Isometric Drawings	3+1	12-09-2026		TLM1, TLM4	
9.	3-D Designs of Simple Aircraft Components: Propeller Blade Hub	3+1	19-09-2026		TLM1, TLM4	
10.	Structural components of the Wing	3+1	26-09-2026		TLM1, TLM4	
11.	Propulsive components like Nozzles, turbines, combustion chambers, etc.	3+1	03-10-2026		TLM1, TLM4	
12.	Engine Casing, Basic Aircraft Model	3+1	10-10-2026		TLM1, TLM4	
13.	Aircraft Components Like Nose, Wing, Fuselage, Tail parts, etc.	3+1	17-10-2026		TLM1, TLM4	
14.	Repetition	3+1	31-10-2026		TLM1, TLM4	
15.	Internal Lab Exam	3+1	07-10-2026		---	
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	Expt. no's	Marks
Day-to-day work = **A**	1,2,3,4,5,6,7,8,9,10,11,12.	A=05
Report = **B**	1,2,3,4,5,6,7,8,9,10,11,12.	B=15
Internal Test = **C**	1,2,3,4,5,6,7,8,9,10,11,12.	C = 10
Cumulative Internal Examination: A+B+C =	1,2,3,4,5,6,7,8,9,10,11,12.	**30**
Semester End Examinations = D	1,2,3,4,5,6,7,8,9,10,11,12.	**D = 70**
Total Marks: A+ B + C + D = 50	1,2,3,4,5,6,7,8,9,10,11,12.	**100**

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the
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

PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
PO9	**Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
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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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

	Course Instructor	**Module Coordinator**	**Head of the Department**
Signature			
Name of the Faculty	Mr. G.V. SURYA NARAYANA	Mr. G.V. SURYA NARAYANA	Dr. P. LOVARAJU