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

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM : II B. Tech., I-Sem., ASE
ACADEMIC YEAR : 2025-26
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	30- 06 - 25		TLM2			
2.	Course Outcomes, Program Outcomes	1	01 – 07 - 25		TLM2			

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	02-07-25		TLM1	CO1	T1,T2	
4.	Bisection method	1	03-07-25		TLM1	CO1	T1,T2	
5.	Secant method	1	05-07-25		TLM1	CO1	T1,T2	
6.	False – position method	1	07-07-25		TLM1	CO1	T1,T2	
7.	False – position method	1	08-07-25		TLM1	CO1	T1,T2	
8.	Iteration method	1	09-07-25		TLM1	CO1	T1,T2	
9.	Newton – Raphson method	1	14-07-25		TLM1	CO1	T1,T2	
10.	Simultaneous equations	1	15-07-25		TLM1	CO1	T1,T2	
11.	Simultaneous equations	1	16-07-25		TLM1	CO1	T1,T2	
12.	Newton's forward interpolation	1	21-07-25		TLM1	CO1	T1,T2	
13.	Newton's backward interpolation	1	22-07-25		TLM1	CO1	T1,T2	
14.	Lagrange's interpolation for unequal parts	1	23-07-25		TLM1	CO1	T1,T2	
15.	Lagrange's interpolation for unequal parts	1	28-07-25		TLM1	CO1	T1,T2	
16.	Tutorial – I	1	19-07-25		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	29-07-25		TLM1	CO2	T1,T2	
18.	Trapezoidal rule	1	30-07-25		TLM1	CO2	T1,T2	
19.	Simpson's 1/3 rule	1	02-08-25		TLM1	CO2	T1,T2	
20.	Simpson's 3/8 rule	1	04-08-25		TLM1	CO2	T1,T2	
21.	Taylor's series method	1	05-08-25		TLM1	CO2	T1,T2	

22.	Picard's method	1	06-08-25		TLM1	CO2	T1,T2	
23.	Euler's method	1	09-08-25		TLM1	CO2	T1,T2	
24.	Runge – Kutta method of 2nd order	1	11-08-25		TLM1	CO2	T1,T2	
25.	Runge – Kutta method of 4th order	1	12-08-25		TLM1	CO2	T1,T2	
26.	Runge – Kutta method of 4th order	1	13-08-25		TLM1	CO2	T1,T2	
27.	Milne's predictor and corrector method	1	18-08-25		TLM1	CO2	T1,T2	
28.	Milne's predictor and corrector method	1	19-08-25		TLM1	CO2	T1,T2	
29.	Revision	1	20-08-25		TLM1	CO2	T1,T2	
30.	Tutorial – II	1	23-08-25		TLM3	CO2	T1,T2	
No. of classes required to complete UNIT-II		14			No. of classes taken:			

I MID EXAMINATIONS (25-08-2025 TO 30-08-2025)

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
31.	Introduction to Unit - III	1	01-09-25		TLM1	CO3	T1,T2	
32.	Laplace transform of standard functions	1	02-09-25		TLM1	CO3	T1,T2	
33.	Properties	1	03-09-25		TLM1	CO3	T1,T2	
34.	Shifting theorems	1	06-09-25		TLM1	CO3	T1,T2	
35.	Transforms of derivatives & integrals	1	08-09-25		TLM1	CO3	T1,T2	
36.	Unit step function& Dirac's delta function	1	09-09-25		TLM1	CO3	T1,T2	
37.	Inverse Laplace by partial fractions	1	10-09-25		TLM1	CO3	T1,T2	
38.	Inverse Laplace by Convolution theorem	1	15-09-25		TLM1	CO3	T1,T2	
39.	Applications to ODE	1	16-09-25		TLM1	CO3	T1,T2	
40.	Integral equations	1	17-09-25		TLM1	CO3	T1,T2	
41.	Tutorial - III	1	20-09-25		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
42.	Introduction to Unit - IV	1	22-09-25		TLM1	CO4	T1,T2	

43.	Fourier series of periodic functions	1	23-09-25		TLM1	CO4	T1,T2	
44.	Dirichlet's conditions	1	24-09-25		TLM1	CO4	T1,T2	
45.	Problems on Fourier series	1	27-09-25		TLM1	CO4	T1,T2	
46.	Even and odd functions	1	04-10-25		TLM1	CO4	T1,T2	
47.	Even and odd functions	1	06-10-25		TLM1	CO4	T1,T2	
48.	Change of intervals	1	07-10-25		TLM1	CO4	T1,T2	
49.	Change of intervals	1	08-10-25		TLM1	CO4	T1,T2	
50.	Half range sine & cosine series	1	13-10-25		TLM1	CO4	T1,T2	
51.	Tutorial - IV	1	14-10-25		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	15-10-25		TLM1	CO5	T1,T2	
51	Fourier integrals	1	18-10-25		TLM1	CO5	T1,T2	
52	Fourier sine & cosine integrals	1	21-10-25		TLM1	CO5	T1,T2	
53	Infinite Fourier transforms	1	22-10-25		TLM1	CO5	T1,T2	
54	Infinite Fourier cosine & sine transforms	1	25-10-25		TLM1	CO5	T1,T2	
55	Infinite Fourier cosine & sine transforms	1	27-10-25		TLM1	CO5	T1,T2	
56	Convolution theorem	1	28-10-25		TLM1	CO5	T1,T2	
57	Finite Fourier transforms	1	29-10-25		TLM1	CO5	T1,T2	
58	Tutorial - V	1	01-11-25		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	01-11-25		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	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Dr. 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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DEPARTMENT OF AEROSPACE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: K. LAKSHMI PRASAD
Course Name : UHV- II: Understanding Harmony and Ethical Human Conduct
Course Code : (23HS01) **Credits** : 3 **L-T-P Structure:** 3-0-0
Program/Sem/Sec : B.Tech III Semester – ASE Section-A **A.Y.** : 2025-26

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): To become more aware of themselves and their surroundings (family, society, nature); they would become more responsible in life and in handling problems with sustainable solutions while keeping human relationships and human nature in mind.

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

- **CO1:** Describe the terms like Natural Acceptance, Happiness and Prosperity (L2)
- **CO2:** Identify one's self, and one's surroundings (family, society nature) (L2)
- **CO3:** Relate human values with human relationship and human society. (L2)
- **CO4:** Illustrate the need for universal human values and harmonious existence (L2)
- **CO5:** Develop as socially and ecologically responsible engineers (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			2			
CO3						3	2	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	2	30.06.25 03.07.25		TLM2	
2.	Process for self exploration: Natural Acceptance	1	04.07.25		TLM.2	
3.	Right Understanding, Relationship and Physical Facility	2	05.07.25 07.07.25		TLM2	
4.	Understanding Value Education	1	10.07.25		TLM2	
5.	self-exploration as the Process for Value Education	2	11.07.25 14.07.25		TLM2	
6.	Continuous Happiness and Prosperity	2	17.07.25 18.07.25		TLM2	
7.	Happiness and Prosperity	1	19.07.25		TLM2	
8.	Method to Fulfill the Basic Human Aspirations	1	21.07.25		TLM2	
9.	Tutorial	1	24.07.25		TLM2	
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
10.	Understanding Human being as the Co-existence of the self and the body	2	25.07.25 28.07.25		TLM2	
11.	Distinguishing between the Needs of the self and the body	2	31.07.25 01.08.25		TLM2	
12.	The body as an Instrument of the self	1	02.08.25		TLM2	
13.	Understanding Harmony in the self	2	04.08.25 07.08.25		TLM2	
14.	Harmony of the self with the body	1	08.08.25		TLM2	
15.	Programme to ensure self-regulation and Health	1	11.08.25		TLM2	
16.	Tutorial - 1	1	14.08.25		TLM2	
17.	Tutorial -2	1	18.08.25		TLM1	
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
18.	Harmony in the Family	2	21.08.25 22.08.25		TLM2	
19.	'Trust' – the Foundational Value in Relationship	2	23.08.25 01.09.25		TLM2	
20.	Practice Session PS7 Exploring the Feeling of Trust	1	04.09.25		TLM2	
21.	'Respect' – as the Right Evaluation	1	05.09.25		TLM2	
22.	Practice Session PS8 Exploring the Feeling of Respect	2	06.09.25 08.09.25		TLM2	
23.	Other Feelings, Justice in Human-to-Human Relationship	2	11.09.25 12.09.25		TLM2	
24.	Understanding Harmony in the Society	2	15.09.25 18.09.25		TLM2	
25.	Vision for the Universal Human Order	1	19.09.25		TLM2	
No. of classes required to complete UNIT-III: 13				**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
26.	Understanding Harmony in the Nature	2	20.09.25 22.09.25		TLM2	
27.	Interconnectedness, self-regulation	2	25.09.25 26.09.25		TLM2	
28.	Mutual Fulfilment among the Four Orders of Nature	2	27.09.25 29.09.25		TLM2	
29.	Realizing Existence as Co-existence at All Levels	2	03.10.25 04.10.25		TLM2	
30.	The Holistic Perception of Harmony in Existence	2	06.10.25 09.10.25		TLM2	
31.	Tutorial -1	2	10.10.25 13.10.25		TLM2	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Implications of the Holistic Understanding

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
32.	Natural acceptance of human values	1	16.10.25		TLM2	
33.	Definitiveness of ethical human conduct	1	17.10.25		TLM2	
34.	Basis for humanistic education	2	18.10.25 20.10.25		TLM2	
35.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human	2	23.10.25 24.10.25		TLM2	
36.	Competence in professional ethics	2	25.10.25 27.10.25		TLM2	
37.	Strategy for transition from the present state to universal human order	1	30.10.25		TLM2	
38.	Holistic Technologies, Production Systems and Management Models-Typical Case	2	31.10.25 01.11.25		TLM2	
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

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work: 30.06.2025			
I Phase of Instructions	30.06.2025	23.08.2025	8
I Mid Examinations	**25.08.2025**	**30.08.2025**	**1**
II Phase of Instructions	01.09.2025	01.11.2025	9
II Mid Examinations	**03.11.2025**	**08.11.2025**	**1**
Preparation and Practical	10.11.2025	15.11.2025	1
Semester End Examinations	**17.11.2025**	**29.11.2025**	**2**

PART-C

EVALUATION PROCESS (R17 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):

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	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	K. LAKSHMI PRASAD	Dr. B. SRINIVASA RAO	Dr. B. SRINIVASA RAO	Dr. M. B. S. SREEKARA REDDY
Signature				

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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.:** 2025-26

PREREQUISITE: **Engineering Mechanics**

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO1	Describle fuctions of various external and internal component of an airplane (L2)
CO2	Classify the various forces and moments acting on an airfoil, (L2)
CO3	Differentiatethe 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,J.D 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	30-06-2025		TLM1	
2.	Components of airplane and their Functions, types	1	02-07-2025		TLM1	
3.	Types of Flight vehicles, classifications	1	04-07-2025		TLM1	
4.	Standard Atmosphere, Altitude	1	07-07-2025		TLM1	
5.	Hydrostatic Equation,	1	09-07-2025		TLM1	
6.	Geopotential and geometric altitude	2	11-07-2025 14-07-2025		TLM1	
No. of classes required to complete UNIT-I: 7				**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	16-07-2025		TLM1	
8.	NACA Airfoils	1	18-07-2025		TLM1	
9.	Geometry, Aerodynamic Forces	1	21-07-2025		TLM1	
10.	Lift, Drag and Moment Coefficients, Co-Efficient of Pressure,	2	23-07-2025 25-07-2025		TLM1	
11.	Centre of Pressure, Aerodynamics Centre, Pressure Distribution Over Aerofoil	2	28-07-2025		TLM1	
12.	Types of Drag	1	30-07-2025		TLM3	
No. of classes required to complete UNIT-II: 8				**No. of classes taken:**		

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	01-08-2025		TLM1	
14.	Reciprocating Engine, Jet Propulsion	1	04-08-2025		TLM1	
15.	The Thrust Equation, Elements of Turbojet Engine	2	06-08-2025 08-08-2025		TLM1	
16.	Turbofan Engine-Rocket Engine	1	11-08-2025		TLM1	
17.	Rocket Propellants- Liquid Propellants, Solid Propellants	2	13-08-2025 18-08-2025		TLM3	
18.	Rocket Staging	2	20-08-2025 22-08-2025		TLM1	
No. of classes required to complete UNIT-III: 9				**No. of classes taken:**		

Mid 1 Exams: 25/8/2025 – 30/8/2025

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	01-09-2025		TLM1	
20.	Components of Wing-Spars, Ribs, Longerons	2	03-09-2025 08-09-2025		TLM1	
21.	Stringers, Bulkheads	1	10-09-2025		TLM1	
22.	Aircraft Materials-Metallic and Non-Metallic Materials	2	12-09-2025 15-09-2025		TLM1	
23.	Use of Aluminium Alloy, Titanium,	2	17-09-2025 19-09-2025		TLM1	
24.	Stainless Steel and Composite Materials.	2	22-09-2025 24-09-2025		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	06-10-2025		TLM1	
26.	Kepler's Laws, Earth and Planetary Entry,	2	08-10-2025 10-10-2025		TLM1	
27.	Space Explorations- Space Vehicles and Its Types	2	13-10-2025 15-10-2025		TLM1	
28.	Reusable Space Vehicles, Space Shuttle,	2	17-10-2025 22-10-2025		TLM1	
29.	Satellites	1	24-10-2025		TLM1	
30.	Types of Satellites and Their Functions	1	27-10-2025		TLM1	
No. of classes required to complete UNIT-V: 9				**No. of classes taken:**		

Mid 2 Exams: 3/11/2025 – 8/11/2025

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	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
(Ashutosh shukla)		(Dr.P.Lovaraju)

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 under Tier - I, Accredited by NAAC
An ISO 21001:2018, 500001:2018, 14001:2015 Certified Institution
DEPARTMENT OF AEROSPACE ENGINEERING
Estd.: 1998 Website: https://www.lbrce.ac.in/ase/index.php Email: hodaero@lbrce.ac.in Phone:08659-222933 Ext:624/623

COURSE HANDOUT
PART-A

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

ACADEMIC YEAR : 2025-26

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	30-7-2025 1-07-2025		TLM1	
2.	Properties of Fluid –Pressure, Temperature, Density, Specific Weight, Specific Gravity, Viscosity-Newton's Law of Viscosity	2	4-07-2025 7-07-2025		TLM1	
3.	Compressibility, Surface Tension, Capillarity, Vapor Pressure	1	08-07-2025		TLM1	
4.	Fluid Statics: Pressure Acting at a Point in a Static Fluid-Pascal's Law	1	11-07-2025		TLM1	
5.	Basic Equation of Fluid Statics, Hydrostatic Pressure Distributions	1	14-07-2025		TLM1	
6.	Manometers	2	15-07-2025 18-07-2025		TLM1	

7.	Hydrostatic Pressure Distributions in gases (earth's atmosphere)	1	21-07-2025		TLM1	
8.	Hydrostatic forces on submerged plane surface (derivation)	1	22-07-2025		TLM1	
9.	Buoyancy and Stability	1	25-07-2025		TLM1	
10.	Tutorial	1	28-07-2025		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	29-07-2025 01-08-2025		TLM1, TLM2	
13.	Differential Relations of Fluid Flow: Velocity Field, Acceleration Field of a Fluid	2	04-08-2025 05-08-2025		TLM1	
14.	Differential Equation of Mass Conservation	1	08-08-2025		TLM1	
15.	Stream Function, Velocity Potential Vorticity, Rotationality, Irrotationality	1	11-8-2025		TLM1	
16.	Differential Equation of Linear Momentum, Euler's Equations	1	12-8-2025		TLM1,	
17.	Potential Flow Bernoulli's Equation and its Applications, Orifice Tank	2	18-08-2025 19-08-2025		TLM1, TLM2	
18.	Venturi meter, Pitot-static Tube, Nozzle, Water Siphon and various other applications	1	22-8-2025		TLM1, TLM2	

19.	Tutorial	1	23-8-2025		TLM3	
20.	Assignment/Quiz-2				----	
No. of classes required to complete UNIT-II		**11**		**No. of classes taken:**		

I MID EXAMINATION	**25-08-2025 to 30-08-2025**

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	01-09-2025		TLM1, TLM4	
22.	Head loss, Darcy-Wiesbach equation, Hydraulic Gradient &Total Energy Lines	2	02-09-2025 05-09-2025		TLM1, TLM2	
23.	Laminar Fully Developed Pipe Flow- Hagen Poiseuille Law	2	08-09-2025 09-09-2025		TLM1	
24.	Pipes in Series, Pipes in Parallel	1	12-09-2025		TLM1, TLM2	
25.	Equivalent Pipe, Hydraulic Diameter, Minor Losses, Moody Chart and its usage	1	15-09-2025		TLM1	
26.	Introduction, Principle of Dimensional Homogeneity,	1	16-09-2025		TLM1	
27.	Buckingham's Pi Theorem	1	19-09-2025		TLM1	
28.	Dimensionless Groups, Similarity	1	22-09-2025		TLM1	
29.	Tutorial	1	23-09-2025		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,	1	26-09-2025		TLM1	
32.	Pelton Turbine working principle	1	29-09-2025		TLM1,TLM5	

33.	Velocity triangles, Work done, Efficiency,	1	30-09-2025		TLM1	
34.	Francis Turbine, working principle,	1	3-10-2025		TLM1	
35.	Velocity triangles, Work done and Efficiency	1	6-10-2025			
36.	Kaplan Turbine, working principle, Velocity triangles, Work done and Efficiency	1	07-10-2025		TLM1	
37.	Draft Tube and its theory, surge tank	1	10-10-2025		TLM1	
38.	Unit and specific quantities	1	13-10-2025		TLM1	
39.	Tutorial	1	14-10-2025		TLM3	
40.	Assignment/Quiz-4					
No. of classes required to complete UNIT-IV		9		**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	1	17-10-2025		TLM1,TLM5	
42.	Velocity Triangles, Work done, Head and Efficiencies	2	18-10-2025 20-10-2025		TLM1	
43.	Losses, Specific Speed, Pumps in Series and Parallel	1	21-10-2025		TLM1,TLM5	
44.	Reciprocating Pumps: Classification, Working Principle	1	24-10-2025		TLM1	
45.	Co-efficient of Discharge and Slip, Indicator Diagram	2	25-10-2025 27-10-2025		TLM1	
46.	Tutorial -5	1	28-10-2025		TLM3	
47.	Assignment/Quiz-5					
No. of classes required to complete UNIT-V		**8**		**No. of classes taken:**		

S.No.	Topics to be covered	Dates	TLM
1.	**Revision**	31-10-2025	TLM2
2.			TLM2

Mid-2	**3-11-2025 to 8-11-2025**

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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Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF 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.:** 2025-2026

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	30-06-2025		TLM 1	
2.	Macroscopic and Microscopic View Point, Thermodynamic system, Continuum, System, Control Volume, Properties of System	1	01-07-2025		TLM 1	
3.	State and Equilibrium, Thermodynamic Equilibrium	1	03-07-2025		TLM 1	
4.	**Tutorial – I**	1	05-07-2025		TLM 3	
5.	Process- Quasi static process-Cycle	1	07-07-2025		TLM 1	
6.	Temperature -Temperature scales, Problems	1	08-07-2025		TLM 1	
7.	Zeroth law of Thermodynamics, energy-forms of energy.	1	10-07-2025		TLM 1	
8.	**Tutorial – II**	1	12-07-2025		TLM 3	
9.	Heat and work	1	14-07-2025		TLM 1 &2	
10	Mechanical forms of work	1	15-07-2025		TLM 1 &2	
11.	Work done in various non-flow process	1	17-07-2025		TLM 1 &2	
12.	Problems on Pdv Work	1	19-07-2025		TLM 1 &2	
13.	Problems on Pdv Work, Path and point function	1	21-07-2025		TLM 1 &2	
14	**Tutorial - III**	1	22-07-2025		TLM 3	
15	Revision & Summary	1	24-07-2025		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	28-07-2025		TLM 1	
17.	Joule's Experiment	1	29-07-2025		TLM 1 &2	
18.	First Law Analysis of closed system.	1	31-07-2025		TLM 1 &2	
19	Different Forms of Stored Energy	1	02-08-2025		TLM 1 &2	
20	**Tutorial – IV**	1	04-08-2025		TLM 3	
21	Energy balance, Internal energy, specific Heat.	1	05-08-2025		TLM 1 &2	

22	Enthalpy, PMM-I, Principle flow work.	1	07-08-2025		TLM 1 &2	
23	Conservation of Energy & mass, Flow Work, Problems on First law applied to closed system	1	09-08-2025		TLM 1 &2	
24	**First law analysis of control volume-** The Steady Flow Process, Steady Flow Energy Equation	1	11-08-2025		TLM 1 &2	
25	**Tutorial – V**	1	12-08-2025		TLM 3	
26	Steady flow engineering devices- Nozzle, Turbine	1	14-08-2025		TLM 1 &2	
27	Compressor, Heat Exchanger	1	18-08-2025		TLM 1 &2	
28	Problems on Steady Flow Devices	1	19-08-2025		TLM 1 &2	
29	Problems on Steady Flow Devices	1	21-08-2025		TLM 1 &2	
30	Revision & Summary	1	23-08-2025		TLM 1 &2	
No. of classes required to complete UNIT-II: 15				**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
31	**Second law of thermodynamics** :Introduction, Thermal energy reservoirs, heat engines	1	01-09-2025		TLM 1	
32	Kelvin-Planks, clausius statement of second law of thermodynamics, Refrigerator, heat pumps,	1	02-09-2025		TLM 1	
33	Equivalence of kelvin-plank and clausius statements, Perpetual motion machines, reversible and irreversible process	1	04-09-2025		TLM 2	
34	**Tutorial – VI**	1	06-09-2025		TLM 3	
35	Carnot cycle, Carnot principles, Corollary of Carnot Theorem, Absolute Thermodynamic Temperature Scale,the carnot heat engine.	1	08-09-2025		TLM 1	
36	Problems	1	09-09-2025		TLM 1 &2	
37	**Entropy**: Introduction, Clausius inequality, property diagrams, Max well Relation.	1	11-09-2025		TLM 1 &2	
38	**Tutorial - VII**	1	13-09-2025		TLM 3	
39	Entropy change forcompressible and incompressible substances, Isentropic relations for ideal gases, Principle of increase of Entropy, TD third law.	1	15-09-2025		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
40	**Pure substance**: Introduction, phase of pure substance, Phase change processes, property diagrams	1	16-09-2025		TLM 1 &2	
41	P-V-T surface, property tables	1	18-09-2025		TLM 1 &2	
42	h-s Diagram or Mollier Diagram for pure Substance	1	20-09-2025		TLM 1 &2	
43	Dryness Fraction-Saturated Liquid Vapor Mixture.	1	22-09-2025		TLM 1 &2	
44	**Tutorial – VIII**	1	23-09-2025		TLM 3	
45	Problems on Pure Substances	1	25-09-2025		TLM 1 &2	
46	Gas power cycles-Introduction, Analysis of power cycles- Carnot, Air-standard Assumptions.	1	27-09-2025		TLM 1 &2	
47	Analysis of Otto cycle	1	29-09-2025		TLM 1 &2	
48	Analysis of Diesel, Dual cycle	1	04-10-2025		TLM 1 &2	
49	Analysis of Brayton Cycle, Problems on gas power cycles	1	06-10-2025		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
50	Classification of IC Engines,	1	07-10-2025		TLM 1 &2	
51	Components of IC engines	1	09-10-2025		TLM 1 &2	
52	Working Principles of 4-Stroke	1	11-10-2025		TLM 1 &2	
53	2-Storke Engines Working	1	13-10-2025		TLM 1 &2	
54	Principles of Spark Ignition (SI) Engine	1	14-10-2025		TLM 1 &2	

55	Compression Ignition (CI) Engine	1	16-10-2025		TLM 1 &2	
56	**Tutorial – IX**	1	18-10-2025		TLM 3	
57	Valve and Port Timing Diagrams	1	20-10-2025		TLM 1 &2	
58	Air-fuel Mixture	1	23-10-2025		TLM 1 &2	
59	Carburation,	1	25-10-2025		TLM 1 &2	
60	Performance Analysis of IC engines.	1	27-10-2025		TLM 1 &2	
61	Performance Analysis of IC engines. Problems	1	28-10-2025		TLM 1 &2	
62	Revision of Important Concepts	1	30-10-2025		TLM 1 &2	
63	Revision of Important Concepts	1	01-11-2025		TLM 1 &2	
No. of classes required to complete UNIT-V: 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 (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

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FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM : II B. Tech., III-Sem., ASE
ACADEMIC YEAR : 2025-26
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,EnvironmentalStudies,2/e,Pearsoneducation,2014.

T3.S.AzeemUnnisa,EnvironmentalStudies,AcademicPublishingCompany,2021.

T4.K.RaghavanNambiar,"TextbookofEnvironmentalStudiesforUndergraduate Courses as per UGC model syllabus", SciTech Publications (India), Pvt. Ltd, 2010.

ReferenceBooks:

R1.KVSG Murali Krishna, The Book of Environmental Studies, 2/e, VGS Publishers, 2011.
R2. DeekshaDaveandE.SaiBabaReddy,TextbookofEnvironmentalScience,2/e, Cengage Publications, 2012.
R3.M.AnjiReddy,"TextbookofEnvironmentalSciencesandTechnology",BSPublication, 2014.
R4.J.P.Sharma,ComprehensiveEnvironmentalstudies,Laxmipublications,2006.
R5.J.GlynnHenryandGaryW.Heinke,EnvironmentalSciencesandEngineering, Prentice Hall of India Private limited, 1988.
R6.G.R.Chatwal,ATextBookofEnvironmentalStudies,HimalayaPublishingHouse, 2018.
R7. GilbertM.MastersandWendellP.Ela,IntroductiontoEnvironmentalEngineering 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	30-06-2025		TLM2			
2.	Multidisciplinary Nature ofEnvironmental Studies	1	02-07-2025		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	07-07-2025		TLM1	CO1	T1,T2	
4.	Water resources	1	09-07-2025		TLM1	CO1	T1,T2	
5.	Mineral resources	1	14-07-2025		TLM1	CO1	T1,T2	
6.	Food resources	1	16-07-2025		TLM1	CO1	T1,T2	
7.	Energy resources	1	21-07-2025		TLM1	CO1	T1,T2	
8.	Energy resources	1	23-07-2025		TLM1	CO1	T1,T2	
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
9.	Ecosystems – Structure & Functions	1	28-07-2025		TLM1	CO2	T1,T2	
10.	Ecological succession &	1	30-07-2025		TLM1	CO2	T1,T2	
11.	Food chains, Food webs & Ecological Pyramids	1	04-08-2025		TLM1	CO2	T1,T2	
12.	Types of ecosystems	1	06-08-2025		TLM1	CO2	T1,T2	
13.	Biodiversity – introduction, levels, bio geographic classification	1	11-08-2025		TLM1	CO2	T1,T2	

14.	Values of Biodiversity, India as mega diversity nation	1	13-08-2025		TLM1	CO2	T1,T2	
15.	Threats to biodiversity and Conservation of biodiversity	1	18-08-2025		TLM1	CO2	T1,T2	
16.	Revision	1	20-08-2025		TLM3	CO2	T1,T2	
No. of classes required to complete UNIT-II		08			No. of classes taken:			

I MID EXAMINATIONS (25-08-2025 TO 30-08-2025)

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
17.	Environmental pollution -Air pollution	1	01-09-2025		TLM1	CO3	T1,T2	
18.	Water pollution, Marine pollution, Thermal pollution	1	03-09-2025		TLM1	CO3	T1,T2	
19.	Soil pollution	1	08-09-2025		TLM1	CO3	T1,T2	
20.	Noise pollution & Nuclear Hazards	1	10-09-2025		TLM1	CO3	T1,T2	
21.	Solid waste management	1	15-09-2025		TLM1	CO3	T1,T2	
22.	Disaster management	1	17-09-2025		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
23.	From Unsustainable to Sustainable development	1	22-09-2025		TLM1	CO4	T1,T2	
24.	Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns	1	24-09-2025		TLM1	CO4	T1,T2	
25.	Environmental ethics, Climate change	1	29-09-2025		TLM1	CO4	T1,T2	
26.	Carbon credits & Mission LiFE - Wasteland reclamation. – Consumerism and waste products	1	01-10-2025		TLM1	CO4	T1,T2	
27.	Environmental Acts	1	06-10-2025		TLM1	CO4	T1,T2	
28.	Environmental Acts	1	08-10-2025		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
29.	Population growth, variation among nations. Population explosion – Family Welfare Programmes.	1	13-10-2025		TLM1	CO5	T1,T2	
30.	Environment and human health –Human Rights – Value Education	1	15-10-2025		TLM1	CO5	T1,T2	
31.	HIV/AIDS – Women and Child Welfare	1	20-10-2025		TLM1	CO5	T1,T2	
32.	Role of information Technology in Environment and human health	1	22-10-2025		TLM1	CO5	T1,T2	
33.	Revision	1	27-10-2025		TLM3	CO5	T1,T2	
34.	Revision	1	29-10-2025		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
35.	Case studies	2	18-08-2025 13-10-2025		TLM2	CO2	T1,T2	
No. of classes		2			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-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

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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. A Revanth Reddy/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.: 2025-2026**

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	2	2	-	3	-	-	-	-	1	-	-	2	2	2
CO2	2	2	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).

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	01-07-2025		04-07-2025		TLM4	
2.	Exp No 1	03	08-07-2025		11-07-2025		TLM4	
3.	Exp No 2	03	15-07-2025		18-07-2025		TLM4	
4.	Exp No 3	03	22-07-2025		25-07-2025		TLM4	
5.	Exp No 4	03	29-07-2025		01-08-2025		TLM4	
6.	Exp No 5	03	05-08-2025		08-08-2025		TLM4	
7.	Repeat & Viva-voce	03	12-08-2025		22-08-2025		TLM4	

8.	Exp No 6	03	02-09-2025		05-09-2025		TLM4	
9.	Exp No 7	03	09-09-2025		12-09-2025		TLM4	
10.	Exp No 8	03	16-09-2025		19-10-2025		TLM4	
11.	Exp No 9	03	23-09-2025		26-10-2025		TLM4	
12.	Exp No 10	03	07-10-2025		03-10-2025		TLM4	
13.	Repeat	03	14-10-2025		10–10-2025		TLM4	
14.	Internal Exam	03	28-10-2025		24-10-2025		TLM4	
No. of classes required to complete: 14 & 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 Instructor**	**Module Coordinator**	**Head of the Department**
Signature			
Name of the Faculty	Dr. A Revanth Reddy	Dr. P. Lovaraju	Dr. P. Lovaraju

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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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	**:** 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.:** 2025-26

PRE-REQUISITES: ICGT & Thermal Engineering

COURSE OBJECTIVE: The objective is to familiarize the principle and its evaluation of various performance parameters of mechanical systems and its impact on global environment.

COURSE OUTCOMES (CO): After completion of course, students will be able to

CO1	Estimate various fuel characteristics through experimental testing(Apply-L3)
CO2	Analyze the performance characteristics of Internal Combustion Engines (Analyze-L4)
CO3	Evaluate the performance parameters of refrigeration and air conditioning systems(Apply-L3)

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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**
CO2	**3**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**
CO3	**3**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**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).

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-I		BATCH-II			
1.	Introduction	03	01-07-25		04-07-25		TLM4	
2.	Exp No1.	03	08-07-25		11-07-25		TLM4	
3.	Exp No 2	03	15-07-25		18-07-25		TLM4	
4.	Exp No 3	03	22-07-25		25-07-25		TLM4	
5.	Exp No 4	03	29-07-25		01-08-25		TLM4	
6.	Exp No 5	03	05-08-25		08-08-25		TLM4	
7.	Exp No 6	03	12-08-25		22-08-25		TLM4	
8.	Exp No 7	03	02-09-25		05-09-25		TLM4	
9.	Exp No 8	03	09-09-25		12-09-25		TLM4	
10.	Exp No 9	03	16-09-25		19-09-25		TLM4	
11.	Exp No 10	03	07-10-25		10-10-25		TLM4	
12.	Repetition	03	14-10-25		17-10-25		TLM4	
13.	Lab internal Exam	03	28-10-25		31-10-25		TLM4	
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 (R20 Regulation):

Evaluation Task	**Expt. no's**	**Marks**
Day to Day work = **A**	1,2,3,4,5,6,7,8..	A=10
Record = **B**	1,2,3,4,5,6,7,8	B=05
Internal Test = **C**	1,2,3,4,5,6,7,8	C = 15
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8	**30**
Semester End Examinations = D	1,2,3,4,5,6,7,8	**D =70**
Total Marks: A + B + C + D = 100	1,2,3,4,5,6,7,8	**100**

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To 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.
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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**
Signature			
Name of the Faculty	Mr. I Dakshina Murthy	Mr. I Dakshina Murthy	Dr. P. Lovaraju

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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 : 2025-26
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)
CO5	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	03.07.2025		TLM4	CO1,CO4	
2.	**Experiment-2 :**Basic programs	3	10.07.2025		TLM4	CO1,CO4	
3.	**Experiment 3-** Programs on Functions and Modules	3	17.07.2025		TLM4	CO1,CO4	
4.	**Experiment-4** Programs on Lists & Tuples	3	24.07.2025		TLM4	CO2,CO4	
5	**Experiment-4** Programs on Lists & Tuples	3	31.07.2025		TLM4	CO2,CO4	
5.	**Experiment-5** Programs on Sets & Dictionaries	3	07.08.2025		TLM4	CO2,CO4	
6.	**Experiment-5** Programs on Sets & Dictionaries	3	22.08.2025		TLM4	CO2,CO4	
1st MID Examinations							
7.	**Experiment-6** Programs on Strings and File I/O	3	04.09.2025		TLM4	CO3,CO4	
8.	**Experiment-7** Error Handling and Exceptions	3	11.09.2025		TLM4	CO3,CO4	
9.	**Experiment-8** Exercise programs on OOPS	3	18.09.2025		TLM4	CO3,CO4	

10.	**Experiment-9** Exercise programs on Matplotlib Library, Pandas, Numpy	3	25.09.2025		TLM4	CO3,CO4	
11.	**Experiment-10** Exercise programs on Matplotlib Library, Pandas, Numpy	3	09.10.2025		TLM4	CO3,CO4	
12.	**Experiment-11** Exercise programs on Web scraping and APIs	3	16.10.2025		TLM4	CO3,CO4	
13.	**Experiment-12** Exercise programs on SQLite quires and connections to database	3	23.10.2025		TLM4	CO4,CO5	
14.	Internal Lab Exam	3	30.10.2025				

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.
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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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DEPARTMENT OF AEROSPACE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor:	**: Mr. G V Surya Narayana/Mr. A.Pratyush**	**A.Y.:** 2025-26
Course Name &	**:** Computer Aided Design Lab-Skill Enhancement Course	**Regulation:** R23
Code	**:** 23AES1	
L-T-P Structure	**: 0-1-2**	**Credits: 2**
Program/Sem/Sec	**:** B. Tech/ASE/II Year-I Sem	

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

1 - Low **2** –Medium **3** - 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	02-07-2025		TLM1, TLM4	
2.	Basic AUTOCAD Commands: Basic drawing commands (line, circle, arc, ellipse, polygon, and rectangle).	3	09-07-2025		TLM1, TLM4	
3.	Edit commands (copy, move, erase, zoom).	3	16-07-2025		TLM1, TLM4	
4.	Array commands (polar array, rectangular array, P-edit, divide, pline, offset).	3	23-07-2025		TLM1, TLM4	
5.	Hatching &line commands (hatching with different angles& different types of lines).	3	30-07-2025		TLM1, TLM4	
6.	Mirror & trim commands (mirror an object, trim, extend a line, chamfer & fillet, explode).	3	06-08-2025		TLM1, TLM4	
7.	Dimensioning & text commands (linear, angular, radius, diameter& text).	3	13-08-2025		TLM1, TLM4	
8.	2-D Drawings of Machine Components	3	20-08-2025		TLM1, TLM4	
	CYCLE-II					
9.	Isometric Drawings	3	03-09-2025		TLM1, TLM4	
10.	3-D Designs of Simple Aircraft Components: Propeller Blade Hub	3	10-09-2025		TLM1, TLM4	
11.	Structural components of Wing	3	17-09-2025		TLM1, TLM4	
12.	Propulsive components like Nozzles, Turbine, combustion chamber, etc.	3	24-09-2025		TLM1, TLM4	
13.	Engine Casing	3	01-10-2025		TLM1, TLM4	
14.	Basic Aircraft model	3	08-10-2025		TLM1, TLM4	
15.	Aircraft Components Like Nose, Wing, Fuselage Tail parts, etc.	3	15-10-2025		TLM1, TLM4	
16.	Repetition	3	22-10-2025		TLM1, TLM4	
17.	Internal Lab Exam	3	29-10-2025		-------	
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 (R20 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):

PEO 1	To provide students with sound mathematical, engineering, and multidisciplinary knowledge to solve Aerospace and Allied Engineering
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
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

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
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 teamwork:** 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 Aerospace vehicle design.
PSO 2	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		Dr. P. LOVARAJU