LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)
Accredited by NAAC & NBA (ASE, CE, CSE, ECE, EEE, IT, ME) (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, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931
FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. D. VIJAY KUMAR
Course Name & Code : Numerical Methods & Integral Calculus & 20FE10
L-T-P Structure : 2-1 -0 **Credits:3**
Program/Sem/Sec : II B.Tech/III sem/ME A **A.Y.:** 2023 - 24

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of this course is to enable the students learn Numerical Techniques for solving the equations and apply interpolation techniques. They will also learn about the Fourier analysis of single valued functions, Multiple Integrals in different coordinate systems and Vector differentiation.

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

CO1	Estimate the best fit polynomial for the given tabulated data using Interpolation.(Understand – L2)
CO2	Apply numerical techniques in solving of equations and evaluation of integrals. (Apply – L3)
CO3	Discriminate among Cartesian, Polar and Spherical coordinates in multiple integrals and their respective applications to areas and volumes. (Apply – L3)
CO4	Generate the single valued functions in the form of Fourier series and obtain Fourier series representation of periodic function. (Apply – L3)
CO5	Evaluate the directional derivative, divergence and angular velocity of a vector function. (Apply – L3)

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

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

TEXTBOOKS:

T1 Dr. B.S. Grewal, "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, New Delhi, 2012.
T2 Dr. B. V. Ramana, "Higher Engineering Mathematics", 1st Edition, TMH, New Delhi, 2010.
T3 S. S. Sastry, "Introductory Methods of Numerical Analysis" 5th Edition, PHI Learning Private Limited, New Delhi, 2012.

REFERENCE BOOKS:

R1 M. D. Greenberg, "Advanced Engineering Mathematics", 2nd Edition, TMH Publications, New Delhi, 2011.
R2 Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & sons, New Delhi, 2011.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Interpolation and Finite Differences

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to the course, Course Outcomes	1	08/08/23		TLM1	
2.	Introduction to UNIT I	1	09/08/23		TLM2	
3.	Forward Differences	1	11/08/23		TLM1	
4.	Backward differences	1	16/08/23		TLM1	
5.	Central Differences	1	18/08/23		TLM1	
6.	Symbolic relations and separation of symbols	1	19/08/23		TLM1	
7.	Symbolic relations and separation of symbols	1	22/08/23		TLM1	
8.	Newton's forward formulae for interpolation	1	23/08/23		TLM1	
9.	Newton's backward formulae for interpolation	1	25/08/23		TLM1	
10.	Lagrange's Interpolation	1	26/08/23		TLM1	
11.	Lagrange's Interpolation	1	29/08/23		TLM1	
12.	Tutorial I	1	30/08/23		TLM3	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Numerical solutions of Equations and Numerical Integration

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction to UNIT II	1	01/09/23		TLM2	
14.	Algebraic and Transcendental Equations	1	02/09/23		TLM1	
15.	False Position method	1	05/09/23		TLM1	
16.	False Position method	1	04/09/23		TLM1	
17.	Newton- Raphson Method in one variable	1	08/09/23		TLM1	
18.	Newton- Raphson Method applications	1	12/09/23		TLM1	
19.	Trapezoidal rule	1	13/09/23		TLM1	
20.	Simpson's 1/3 Rule	1	15/09/23		TLM1	
21.	Simpson's 3/8 Rule	1	16/09/23		TLM1	
22.	Tutorial II	1	19/09/23		TLM3	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: Multiple Integrals

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23.	Introduction to Unit-III	1	22/09/23		TLM1	
24.	Double Integrals -Cartesian coordinates	1	23/09/23		TLM1	
25.	Double Integrals- Polar co ordinates	1	26/09/23		TLM1	
26.	Problems	1	25/09/23		TLM1	
27.	Applications to Double integrals (Content Beyond the syllabus)	1	27/09/23		TLM2	
28.	Revision for mid exam	1	29/09/23 30/09/23			

I MID EXAMINATIONS (02-10-2023 TO 07-10-2023)						
29.	Triple Integrals - Cartesian coordinates	1	10/10/23		TLM1	
30.	Triple Integrals - Spherical coordinates	1	11/10/23		TLM1	
31.	Change of order of Integration	1	13/10/23		TLM1	
32.	Tutorial III	1	17/10/23		TLM3	
33.	Change of order of Integration	1	18/10/23		TLM1	
No. of classes required to complete UNIT-III: 10				**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	HOD Sign Weekly
34.	Introduction to UNIT IV	1	25/10/23		TLM1	
35.	Determination of Fourier coefficients, Even and Odd Functions	1	27/10/23		TLM1	
36.	Fourier Series expansion in the interval $[0,2\pi]$	1	28/10/23		TLM1	
37.	Fourier Series expansion in the interval $[-\pi,\pi]$	1	31/10/23		TLM1	
38.	Fourier Series in an arbitrary interval [0, 2l]	1	01/11/23		TLM1	
39.	Fourier Series in an arbitrary interval [-l, l]	1	03/11/23		TLM1	
40.	Fourier series in an arbitrary interval odd and even functions	1	04/11/23		TLM1	
41.	Half-range Sine and Cosine series	1	07/11/23		TLM1	
42.	Half-range Sine and Cosine series		08/11/23		TLM1	
43.	Tutorial IV	1	10/11/23		TLM3	
44.	Introduction to Fourier transforms (Content Beyond the Syllabus)	1	14/11/23		TLM2	
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V: Vector Differentiation

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
45.	Introduction to UNIT V	1	15/11/23		TLM1	
46.	Vector Differentiation	1	17/11/23		TLM1	
47.	Gradient	1	18/11/23		TLM1	
48.	Directional Derivative	1	21/11/23		TLM1	
49.	Divergence	1	22/11/23		TLM1	
50.	Curl	1	24/11/23		TLM1	
51.	Solenoidal and Irrotational functions, potential surfaces	1	25/11/23		TLM1	
52.	Laplacian and second order operators	1	28/11/23		TLM1	
53.	TUTORIAL - V	1	29/11/23		TLM3	
54.	Properties	1	01/12/23		TLM1	
55.	Introduction to Vector Integrals (Content Beyond the Syllabus)	1	02/12/23		TLM1	
No. of classes required to complete UNIT-V: 11				**No. of classes taken:**		

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

TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME 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.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr. D. Vijay Kumar**	**Dr. K. R. Kavitha**	**Dr. A. Rami Reddy**	**Dr. A. Rami Reddy**
Signature				

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PART-A

Name of Course Instructor: T.Nagadurga
Course Name & Code : Basic Electrical and Electronics Engineering-20EE02
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech., I-Sem., ASE – A section **A.Y.:** 2023-24

PREREQUISITE: None

COURSE EDUCATIONAL OBJECTIVES (CEOs):

This course enables student to illustrate the basics of applied electricity and electronics.

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

CO1	CO1: Apply network reduction techniques to simplify electrical circuits
CO2	CO2: Illustrate the working principle of DC machines and transformers
CO3	CO3: Understand V-I characteristics of semiconductor devices.
CO4	CO4: Illustrate the configuration of Transistors and their applications

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										1			
CO2	3	2										1			
CO3	3	2										1			
CO4	3	2										1			
1 - Low			**2 –**Medium								**3 -** High				

TEXTBOOKS:

T1. A.Sudhakar and Shyammohan S Palli, Electrical Circuits, Tata McGraw-Hill, 3rd Edition.

T2. M.S.Sukhija, T.K.Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford University Press, 2016 Edition.

REFERENCE BOOKS:

R1: Kothari and Nagarath, "Basic Electrical Engineering", TMH Publications, 3rd Edition.2013

R2: G.S.N.Raju, "Electronic Devices and Circuits", I.K.International.2006

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - B

UNIT-I: ELECTRICAL CIRCUIT FUNDAMENTALS

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	1	7/8/23		TLM1	
2.	Basic definitions	1	8/8/23		TLM1	
3.	Types of elements	1	9/8/23		TLM1	
4.	R,L,C parameters	1	11/8/23		TLM1	
5.	Ohm's Law, Kirchhoff's Laws	1	14/8/23		TLM1	
6.	Series & parallel Star to delta, Delta to star	1	16/8/23		TLM1	
7.	Source transformations	1	18/8/23		TLM1	
8.	Mesh Analysis	1	21/8/23		TLM2	
9.	Nodal Analysis	1	22/8/23		TLM2	
10.	Assignment/Quiz-I	1	23/8/23		TLM6	
11.	Problems	1	25/8/23			
12.	Problems	1	28/8/23			
No. of classes required to complete UNIT-I		12				

UNIT-II : AC FUNDAMENTALS and NETWORK THEOREMS

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.	Superposition Theorem	1	29/8/23		TLM1	
2.	Thevenin's Theorem	1	30/8/23		TLM1	
3.	Norton's Theorem	1	4/9/23		TLM1	
4.	Maximum Power Transfer Theorem	1	5/9/23		TLM1	
5.	Peak, R.M.S, average and	1	8/9/23		TLM1	

	instantaneous values					
6.	Form factor and Peak factor for periodic waveforms Phase and Phase difference	1	11/9/23		TLM1	
7.	Reactance, Impedance, Susceptance and Admittance	1	12/9/23		TLM1	
8.	Real, Reactive and apparent Powers, Power factor	1	13/9/23		TLM1	
9.	Resonance	1	15/9/23		TLM2	
10.	Band Width & Quality Factor	1	19/9/23		TLM1	
11.	Problems	1	20/9/23		TLM1	
12.	Assignment/Quiz-II	1	22/9/23		TLM6	
13.	MID-I		3/10/23			
14.	MID-I		4/10/23			
15.	MID-I		6/10/23			
No. of classes required to complete UNIT-II		12				

UNIT-III : DC Machine Fundamentals and Single Phase Transformers

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.	Introduction to Electrical Machine	1	9/10/23		TLM1	
17.	DC generator principle	1	10/10/23		TLM1	
18.	constructional details	1	11/10/23		TLM1	
19.	EMF equation	1	13/10/23		TLM1	
20.	types of generators	1	16/10/23		TLM1	
21.	DC motor principle, Back emf	1	17/10/23		TLM1	
22.	types of motors motor applications	1	18/10/23		TLM2	
23.	Principle of operation of single phase transformers	1	20/10/23		TLM1	
24.	Construction of single phase transformers	1	24/10/23		TLM2	
25.	EMF equation of Transformer	1	25/10/23		TLM2	
26.	Assignment/Quiz-III	1	27/10/23		TLM6	
27.	Problems	1	30/10/23		TLM1	
28.	Problems	1	31/10/23		TLM1	
No. of classes required to complete UNIT-III		13				

UNIT-IV : P-N Junction Diode and Zener Diode

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
29.	Introduction to Electronic Devices	1	1/11/23		TLM1	
30.	Operation of PN junction diode	1	3/11/23		TLM2	
31.	V-I characteristics of PN junction diode	1	6/11/23		TLM2	
32.	Half Wave Rectifier	1	7/11/23		TLM1	
33.	Full Wave Rectifier-Bridge type	1	8/11/23		TLM1	
34.	Operation of Zener Diode	1	10/11/23		TLM1	
35.	V-I characteristics of Zener Diode	1	13/11/23		TLM1	
36.	Zener Diode as Voltage Regulator	1	14/11/23		TLM2	
37.	Problems	1	15/11/23		TLM1	
38.	Assignment/Quiz-4	1	17/11/23		TLM6	
No. of classes required to complete UNIT-IV		12				

UNIT-V: Transistors

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
39.	Introduction and symbol of Transistor	1	20/11/23		TLM1	
40.	Introduction and symbol of Transistor	1	21/11/23		TLM1	
41.	Principle, Operation and Construction - Transistor	1	22/11/23		TLM1	
42.	CB configuration	1	24/11/23		TLM1	
43.	CB, CE configuration	1	27/11/23		TLM1	
44.	CE configuration	1	28/11/23		TLM2	
45.	JFET	1	29/11/23		TLM2	
46.	MOSFET	1	1/12/23		TLM1	
47.	Application of transistor as an amplifier	2	1/12/23		TLM2	
48.	MID-II	1	4/12/23			
49.	MID-II	1	5/12/23			
50.	MID-II	1	6/12/23			
51.	MID-II	1	8/12/23			
No. of classes required to complete UNIT-V		13				

CONTENT BEYOND SYLLABUS:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods
1	Applications of DC Machines	1	1/12/23		TLM2

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and 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	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO 2	Design and analyze electrical machines, modern drive and lighting systems
PSO 3	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO4	Design controllers for electrical and electronic systems to improve their performance.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr.T.Nagadurga**	**Dr.T.Nagadurga**	Dr.G.Nageswara Rao	Dr.J.S.Vara Prasad
Signature				

LAKKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF AEROSPACE ENGINEERING
(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi, NAAC Accredited, Certified by ISO 9001:2015
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT
PART-A

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

ACADEMIC YEAR : 2023-24

COURSE NAME & CODE : **Engineering Fluid Mechanics**-**20AE02**

L-T-P STRUCTURE : 2-1-0

COURSE CREDITS : 3

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

PRE-REQUISITE: Nil

Course Educational Objectives: To demonstrate the properties of fluids and behavior of fluids under static conditions, differential relations for fluid flows, features of flow though pipes and to understand the working of Hydraulic turbines and Hydraulic pumps.

Course Outcomes: At the end of the course, the student will be able to
CO1: Analyze the forces acting on objects submerged in fluids under static conditions (Analyze-L4)
CO2: Apply differential relations to characterize the behavior of fluid flow (Apply-L3)
CO3: Apply the conservation laws to solve elementary fluid flow problems (Apply-L3)
CO4: Analyze the simple pipe network for fluid transportation (Azalyze-L4)
CO5: Analyze the performance of various hydraulic turbines and pumps (Analyze-L4)

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
20AE02	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
	CO5	3	2	2	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 BOOKS:

T1 White. F.M, Fluid Mechanics, Seventh Edition, McGraw-Hill Education 2011.

T2 Rathakrishnan. E, Fluid Mechanics an Introduction, Fourth Edition, Prentice Hall of India, 2022

REFERENCE BOOKS:

R1 Balachandran P, Engineering Fluid Mechanics, Prentice Hall of India, 2012

R2 Fox. R.W, Mcdonald, A.J, Introduction of Fluid Mechanics, Fifth Edition, John Wiely, 1999

R3 Douglas. J.F, Gesiorek. J.M., Swaffield. J, A., Fluid Mechanics, Fourth Edition, Pearson Education, 2002.

R4 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	7-08-2023 9-08-2023		TLM1	
2.	Properties of Fluid –Pressure, Temperature, Density, Specific Weight, Specific Gravity, Viscosity-Newton's Law of Viscosity	2	10-08-2023 11-08-2023		TLM1	
3.	Compressibility, Surface Tension, Capillarity, Vapor Pressure	1	14-08-2023		TLM1	
4.	Fluid Statics: Pressure Acting at a Point in a Static Fluid-Pascal's Law	1	16-08-2023		TLM1	
5.	Basic Equation of Fluid Statics,	1	17-08-2023		TLM1	

	Hydrostatic Pressure Distributions					
6.	Manometers	2	18-08-2023 21-08-2023		TLM1	
7.	Hydrostatic Pressure Distributions in gases (earth's atmosphere)	1	23-08-2023		TLM1	
8.	Hydrostastic forces on submerged plane surface (derivation)	2	24-08-2023 25-08-2023		TLM1	
9.	Buoyancy and Stability	1	28-08-2023		TLM1	
10.	Tutorial	1	30-08-2023		TLM3	
11.	Assignment/Quiz-1				---	
No. of classes required to complete UNIT-I		**14**		**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
	Lagrangian and Eulerian approaches, Flow Patterns- Pathline, Streamline, Streakline, Timeline, Stream Tube	2	31-08-2023		TLM1, TLM2	
12.	Differential Relations of Fluid Flow: Velocity Field, Acceleration Field of a Fluid	1	1-09-2023		TLM1,TLM2	
13.	Differential Equation of Mass Conservation	1	4-09-2023		TLM1,TLM2	
14.	Stream Function, Velocity Potential Vorticity, Rotationality, Irrotationality	2	7-09-2023 8-09-2023		TLM1	
15.	Differential Equation of Linear Momentum, Euler's Equations	2	11-09-2023 13-09-2023		TLM1, TLM2	

16.	Potential Flow, Bernoulli's Equation	2	14-09-2023 15-09-2023		TLM1	
17.	Bernoulli's Equation and its Applications, Orifice Tank	1	20-09-2023 21-09-2023		TLM1	
18.	Venturi meter, Pitot-static Tube and various other applications	2	22-09-2023 25-09-2023			
19.	Tutorial	1	27-09-2023		TLM3	
20.	Assignment/Quiz-2				----	
No. of classes required to complete UNIT-II		**14**		**No. of classes taken:**		

I Mid Examination (3/10/2023 to 9/10/2023)

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	29-09-2023		TLM1,TLM4	
22.	Head loss, Darcy-Wiesbach equation, Hydraulic Gradient &Total Energy Lines	2	11-10-2023 12-10-2023		TLM1, TLM2	
23.	Laminar Fully Developed Pipe Flow- Hagen Poiseuille Law	2	13-10-2023 16-10-2023		TLM1	
24.	Pipes in Series, Pipes in Parallel	2	18-10-2023 19-10-2023		TLM1, TLM2	
25.	Equivalent Pipe, Hydraulic Diameter, Minor Losses, Moody Chart and its usage	1	20-10-2023		TLM1	
26.	Introduction, Principle of Dimensional Homogeneity,	1	25-10-2023		TLM1	
27.	Buckingham's Pi Theorem	1	26-10-2023		TLM1	
28.	Dimensionless Groups, Similarity	1	27-10-2023		TLM1	
29.	Tutorial	1	30-10-2023		TLM3	
30.	Assignment/Quiz-3					
No. of classes required to complete UNIT-III		12		**No. of classes taken:**		

UNIT-IV: Hydraulic Turbines & Performance of Hydraulic Turbines

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	Introduction, Classification of turbines- Hydro-electric power plants impulse and reaction turbines,	2	1-11-2023 2-11-2023		TLM1	
32.	Pelton Turbine working principle	1	3-11-2023		TLM1,TLM5	
33.	Velocity triangles, Work done, Efficiency, Condition for maximum efficiency	2	6-11-2023 8-11-2023		TLM1	
34.	Francis Turbine, working principle,	1	9-11-2023		TLM1	
35.	Velocity triangles, Work done and Efficiency	1	10-11-2023			
36.	Kaplan Turbine, working principle, Velocity triangles, Work done and Efficiency	1	13-11-2023		TLM1	
37.	Draft Tube and its theory	1	15-11-2023		TLM1	
38.	Geometric similarity, Unit and specific quantities	1	16-11-2023		TLM1	
39.	Tutorial		17-11-2023		TLM3	
40.	Assignment/Quiz-4					
No. of classes required to complete UNIT-IV		10		**No. of classes taken:**		

UNIT-V: Reciprocating and Centrifugal 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.	Reciprocating Pumps: Classification, Working Principle,	1	20-11-2023		TLM1,TLM5	

42.	Co-efficient of Discharge and Slip, Indicator Diagram	1	22-11-2023		TLM1	
43.	Centrifugal Pumps: Classification, Working Principle, Constructional Details	1	23-11-2023		TLM1,TLM5	
44.	Velocity Triangles, Work done, Head and Efficiencies	1	24-11-2023		TLM1	
45.	Losses, Specific Speed, Pumps in Series and Parallel	1	27-11-2023		TLM1	
46.	Performance Characteristics	1	29-11-2023		TLM1	
47.	Tutorial -5	1	30-11-2023		TLM3	
48.	Assignment/Quiz-5	1				
49.	Revision				TLM2	
No. of classes required to complete UNIT-V		**8**		**No. of classes taken:**		

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 (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

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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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF AEROSPACE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. I. Dakshina Murthy

Course Name & Code : Engineering Thermodynamics (20AE03) **Regulation**: R20
L-T-P Structure : **2-1-0** **Credits:** 3
Program/Sem/Sec : B.Tech/III/-- **A.Y.:** 2023-2024

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	Analyze the entropy change of various processes (Apply-L3)
CO4	Analyze the properties of different gas mixtures and pure substances. (Analyze-L4)
CO5	Analyze ideal gas power cycles and refrigeration cycle to estimate various performance parameters (Analyze-L4)

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	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	07-08-2023		TLM 1	
2.	Macroscopic and Microscopic View Point, Continuum, System, Control Volume, Properties of System	1	08-08-2023		TLM 1	
3.	State and Equilibrium, Thermodynamic Equilibrium	1	10-08-2023		TLM 1	
4.	**Tutorial – I**	1	14-08-2023		TLM 3	
5.	Process- Quasi static process-Cycle	1	17-08-2023		TLM 1	
6.	Temperature -Temperature scales, Problems	1	19-08-2023		TLM 1	
7.	Zeroth law of Thermodynamics, energy-forms of energy, heat, work, Mechanical forms of work	1	21-08-2023		TLM 1	
8.	**Tutorial – II**	1	22-08-2023		TLM 3	
9.	Moving boundary of system, Thermodynamic definition of work, Moving Boundary work	1	24-08-2023		TLM 1 &2	
10.	Work done in various non-flow process, Problems on Pdv Work	1	26-08-2023		TLM 1 &2	
11.	Problems on Pdv Work, Path and point function	1	28-08-2023		TLM 1 &2	
12.	**Tutorial - III**	1	29-08-2023		TLM 3	
13.	Revision & Summary	1	31-08-2023			
No. of classes required to complete UNIT-I: 13				**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
14.	**First Law of Thermodynamics**: Introduction	1	02-09-2023		TLM 1	
15.	Joule's Experiment	1	04-09-2023		TLM 1 &2	
16.	First Law Analysis of closed system, Different Forms of Stored Energy	1	05-09-2023		TLM 1 &2	
17.	**Tutorial – IV**	1	07-09-2023		TLM 3	
18.	Energy balance, Internal energy, specific heat, Enthalpy, PMM-I	1	11-09-2023		TLM 1 &2	
19.	Conservation of Energy, Flow Work, Problems on First law applied to closed system	1	12-09-2023		TLM 1 &2	
20.	**First law analysis of control volume-** The Steady Flow Process, Steady Flow Energy Equation	1	14-09-2023		TLM 1 &2	

21.	**Tutorial – V**	1	16-09-2023		TLM 3	
22.	Steady flow engineering devices- Nozzle, Turbine, compressor, Heat Exchanger	1	19-09-2023		TLM 1 &2	
23.	Problems on Steady Flow Devices	1	21-09-2023		TLM 1 &2	
24.	Revision & Summary	1	23-09-2023			
No. of classes required to complete UNIT-II: 11				**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
25.	**Second law of thermodynamics** :Introduction, Thermal energy reservoirs, heat engines	1	25-10-2023		TLM 1	
26.	Kelvin-Planks, clausius statement of second law of thermodynamics, Refrigerator, heat pumps,	1	26-10-2023		TLM 1	
27.	Equivalence of kelvin-plank and clausius statements, Perpetual motion machines, reversible and irreversible process	1	30-10-2023		TLM 2	
28.	**Tutorial – VI**	1	09-10-2023		TLM 3	
29.	Carnot cycle, Carnot principles, Corollary of Carnot Theorem, Absolute Thermodynamic Temperature Scale	2	10-10-2023		TLM 1	
30.	Problems	2	12-10-2023		TLM 1 &2	
31.	**Entropy**: Introduction, Clausius inequality, property diagrams	2	16-10-2023		TLM 1 &2	
32.	**Tutorial - VII**	1	17-10-2023		TLM 3	
33.	Max well Relation, entropy change for ideal gases, Isentropic relations for ideal gases, Principle of increase of entropy	2	19-10-2023		TLM 1 &2	
No. of classes required to complete UNIT-III: 13			**No. of classes Taken:**			

UNIT-IV: NON REACTIVE GAS MIXTURES & PROPERTIES OF PURE SUBSTANCES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
34.	**Non reactive gas mixtures**- Introduction, Mass fraction, mole fraction, Daltons law of additive pressures, Amagat's law of additive volumes	1	21-10-2023		TLM 1 &2	
35.	Ideal gas mixture, problems on Gas Mixtures	2	24-10-2023		TLM 1 &2	
36.	**Pure substance**: Introduction, phase of pure substance, Phase change processes, property diagrams	2	26-10-2023		TLM 1 &2	
37.	**Tutorial – VIII**	1	28-10-2023		TLM 3	
38.	P-V-T surface, property tables, h-s Diagram or Mollier Diagram for pure	1	30-10-2023		TLM 1 &2	

	Substance					
39.	Problems on Pure Substances	2	31-10-2023 02-11-2023		TLM 1 &2	
No. of classes required to complete UNIT-IV: 9			**No. of classes Taken:**			

UNIT-V: GAS POWER CYCLES AND REFRIGERATION 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.	**Gas power cycles**-Introduction, Analysis of power cycles- Carnot, Otto	2	04-11-2023 06-11-2023		TLM 1 &2	
41.	Analysis of Diesel, Dual	2	07-11-2023 09-11-2023		TLM 1 &2	
42.	Analysis of Brayton Cycle, Problems on gas power cycles	2	13-11-2023 14-11-2023		TLM 1 &2	
43.	**Tutorial – IX**	1	16-11-2023		TLM 3	
44.	**Refrigeration Cycles**: Reversed Carnot cycle, Bell-Coleman cycle,	2	18-11-2023 20-11-2023		TLM 1 &2	
45.	Simple vapor compression cycle, Problems	2	21-11-2023 23-11-2023 25-11-2023		TLM 1 &2	
46.	Revision of Important Concepts	3	27-11-2023 28-11-2023 02-12-2023		TLM 1 &2	
No. of classes required to complete UNIT-V: 11			**No. of classes Taken:**			

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

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

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

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF AEROSPACE ENGINERRING

COURSE HANDOUT

PART-A

Name of Course Instructor: Ashutosh shukla
Course Name & Code **:** Strength of Materials & 20AE04
L-T-P Structure **:3-1-0** **Credits:** 3
Program/Sem/Sec : B.Tech/III Sem **A.Y.:** 2023-24

PREREQUISITE: Engineering Mechanics

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO1	Analyze the stress and strain behavior in different types of members under various load conditions
CO2	Evaluate stress, shear force, bending moment, deflection for beams and torsion for circular shafts under different loading conditions
CO3	Evaluate shear stress distributions over different cross sections
CO4	Apply the failure theories on structural members principle stresses.
CO5	Analyze internal stresses due to internal pressures in thin and thick cylindrical shells.

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	3	2								3	3	2
CO2	3	3	3	2								3	3	2
CO3	3	3	3	2								3	3	2
CO4	3	3	3	3								3	3	1
CO5	3	3	3	3								3	3	2
1 - Low					**2 –**Medium						**3 -** High			

TEXTBOOKS:

T1 Ramamrutham. S, Narayanan R, Strength of Materials, Dhanpat Rai & Sons, 2017.

REFERENCE BOOKS:

R1 Popov. E. P, Mechanics of Materials, Prentice Hall Inc, 1976

R2 Andrew. P, Singer F.L., Strength of Materials, Harper and Row Publishers, New York, 1987.

R3 Gambhir. M. L, Fundamentals of Solid Mechanics, PHI Learning, 2009. Subramanian. R, Strength of Materials, Second Edition, Oxford University Press, 2010.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: SIMPLE STRESSES AND STRAINS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to strength of material	1	8-08-23		TLM1	
2.	Properties of material, Stress	1	9-08-23		TLM1	
3.	Types of stresses strains	1	11-08-23		TLM1	
4.	Stress strain diagrams for ductile, brittle	1	17-08-23		TLM1	
5.	stepped bars, Bars of varying c/s	1	18-08-23		TLM1	
6.	Composite bar problems	1	19-08-23		TLM3	
7.	Volumetric Strain	1	22-08-23		TLM1	
8.	Thermal stresses	1	24-08-23		TLM1	
9.	strain energy due to axial force	1	25-08-23		TLM1	
10.	Strain energy problems	1	26-08-23		TLM3	
11.	stresses due to sudden loads and impact	1	31-08-23		TLM1	
12.	Relation between elastic Constants	1	01-09-23		TLM1	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: SHEAR FORCE AND BENDING MOMENT

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction to SF and BM	1	02-09-23		TLM1	
14.	Relationship B/W SF and B.M	1	5-09-23		TLM1	
15.	SFD & BMD for cantilever beam	1	08-09-23		TLM1	
16.	Cantilever beam problems	1	12-09-23		TLM1	
17.	UDL on cantilever beam problems	1	14-09-23		TLM1	
18.	SFD & BMD for S.S.B	1	15-09-23		TLM3	
19.	Combination of loads for cantilever	1	16-09-23		TLM1	
20.	Combination of loads for S.S.B	1	21-09-23		TLM1	
21.	Point of contra flexure	1	22-09-23		TLM1	
22.	Maximum Bending Moment	1	23-09-23		TLM1	
23.	SFD and BMD for Overhang beams	1	26-09-23		TLM1	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III: STRESSES IN BEAMS, TORSION

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	Theory of simple bending	1	29-09-23		TLM1	
25.	Derivation of Flexural equation	1	29-09-23		TLM1	
26.	Section modulus of various cross section	1	30-09-23		TLM1	
27.	Flexural stresses	1	30-09-23		TLM1	
28.	Normal stresses due to flexure	1	30-09-23		TLM1	
29.	Bending stress problems	1	10-10-23		TLM3	
30.	Theory of pure torsion & Assumptions	1	12-10-23		TLM1	
31.	Derivation of Torsion equations	1	13-10-23		TLM1	
32.	Torsion problems-Solid and hollow	1	14-10-23		TLM1	
33.	Power transmitted by shaft	1	17-10-23		TLM3	
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: SHEAR STRESSES, PRINCIPAL STRESSES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
34.	Introduction to shear stress	1	19-10-23		TLM1	
35.	Shear stress distribution	1	26-10-22		TLM1	
36.	Shear stress distribution across I,T sections	1	28-10-23		TLM1	
37.	Principal Stresses	1	31-10-23		TLM3	
38.	Member Subjected to Direct Stresses	1	02-11-23		TLM1	
39.	Normal & Tangential stresses on inclined	1	04-11-23		TLM1	
40.	Stresses on inclined planes	1	07-11-23		TLM1	
41.	Max. Principal stress , strain Theory	1	09-11-23		TLM3	
42.	Max. distortion, strain energy theory	1	10-11-23		TLM1	
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V: DEFLECTION OF BEAMS, CYLINDERS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
43.	Introduction to deflection of beams	1	14-11-23		TLM1	
44.	Differential equation of Elastic line	1	16-11-23		TLM1	
45.	Deflection of SSB beams	1	17-11-23		TLM1	
46.	Deflection of Cantilever beams	1	18-11-23		TLM1	
47.	Macaulay's Method for prismatic members	1	21-11-23		TLM1	
48.	Area moment method for stepped beams	1	23-11-23		TLM1	
49.	Deflection of overhang beams	1	24-11-23		TLM1	
50.	Hoop and longitudinal stresses thin cylin.	1	25-11-23		TLM3	
51.	Thin cylindrical shells	1	28-11-23		TLM1	
52.	Hoop and longitudinal stresses	1	30-11-23		TLM1	
53.	Thick cylindrical shells	1	1-12-23		TLM1	
54.	Spherical shells changes in dimensions	1	2-12-23		TLM3	
No. of classes required to complete UNIT-V: 14				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	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)	(S.Indrasena Reddy)	(Dr.P.Lovaraju)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF AEROSPACE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. Shaheda Niloufer
Course Name & Code : Environmental Science & 20MC03
L-T-P Structure : 2-0-0 Credits : 0
Program/Sem/Sec : B.Tech., ASE., III-Sem. A.Y : 2021-22

PRE-REQUISITE:

COURSE EDUCATIONAL OBJECTIVES (CEOs): The purpose of this course is to provide a general background on developing an understanding of systems and cycles on the earth and how individual organisms live together in complex communities and how human activities influence our air, water and soil. It also helps in developing an understanding about our use of fossil fuels and effect on climate and sustainable management of natural resources.

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

CO 1	Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions.
CO 2	Evaluate local, regional and global environmental issues related to resources and their sustainable management.
CO 3	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO 4	Acknowledge and prevent the problems related to pollution of air, water and soil.
CO5	Identify the significance of implementing environmental laws and abatement devices for environmental management.

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).

TEXT BOOKS:

T1 Anubha Kaushik, C.P.Kaushik, "Perspectives in Environmental Studies", New age international publishers, 5th Edition, Delhi, 2016.

T2 Mahua Basu, S. Xavier, "Fundamentals of Environmental Studies", Cambridge University Press, 1st Edition, Delhi, 2016.

REFERENCE BOOKS:

R1 S. Deswal, A. Deswal, "A Basic course in Environmental Studies", Educational & Technical Publishers, 2nd Edition, Delhi, 2014.

R2 R. Rajagopalan, "*Environmental Studies (From Crisis to Cure)*", Oxford University Press,

2nd Edition, New Delhi, 2012.
R3 De, A.K, "Environmental Chemistry", New Age International (P) Limited, 5th Edition, New Delhi, 2003.
R4 Dr.K.V.S.G. Murali Krishna, "Environmental Studies", VGS Techno Series, 1st Edition, Vijayawada, 2010.
R5 G. Tyler Miller, Scott Spoolman, "Introduction to Environmental Studies", Cengage Learning, 13th Edition, New Delhi, 2009.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: NATURE AND SCOPE OF ENVIRONMENTAL PROBLEMS

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 of course and course objectives. Introduction of components of Environment	1	16-09-2022		2	
2.	Population explosion and variations among Nations.	1	17-09-2022		2	
3.	Resettlement and Rehabilitation - Issues and possible solutions	1	23-09-2022		2	
4.	Environmental Hazards	1	24-09-2022		2	
5.	Role of Information Technology in environmental management and human health.	1	30-09-2022		2	
No. of classes required to complete UNIT-I: 5				No. of classes taken:		

UNIT-II: NATURAL RESOURCES AND CONSERVATION

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 classification of Natural resources, Forest Resources,	1	01-10-2022		2	
2.	Water Resources	1	14-10-2022		2	
3.	Mineral Resources	1	15-10-2022		2	
4.	Food Resources	1	21-10-2022		2	
5.	Food Resources	1	22-10-2022		2	
6.	Mineral Resources	1	28-10-2022		2	
No. of classes required to complete UNIT-II: 6				No. of classes taken:		

UNIT-III: ECOLOGY AND BIODIVERSITY

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.	Definition, structure and functions of an ecosystem	1	29-10-2022		2	
2.	Food chains and Food webs, Ecological succession, Ecological pyramids, Bio-geo-chemical cycles Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem, Ecological Niche and Keystone Species, Bio-geographical classification of	1	04-11-2022		2	

	India. India as a mega diversity nation					
3.	Values of biodiversity- Direct and Indirect values.	1	05-11-2022		2	
4.	**I MID EXAMINATION**		11-11-2022			
5.	Threats to biodiversity; Assignment in Unit II	1	18-11-2022		2	
6.	Man and wild life conflicts. Endangered and endemic species of India	1	19-11-2022		2,3	
7.	Conservation of biodiversity: In-situ and Ex-situ conservation methods	1	25-11-2022		2	
No. of classes required to complete UNIT-III: 6				No. of classes taken:		

UNIT-IV : ENVIRONMENTAL POLLUTION

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.	Air Pollution	1	26-11-2022		2	
2.	Causes, effects and control measures of: Water Pollution	1	02-12-2022		2	
3.	Causes, effects and control measures of: Soil Pollution,		03-12-2022		2	
4.	Noise Pollution		09-12-2022		2	
5.	Solid Waste Management	1	16-12-2022		2,3	
6.	Disaster Management- Floods, Cyclones, Earthquakes, Landslides and Tsunamis.	1	17-12-2022		2	
No. of classes required to complete UNIT-IV: 6				No. of classes taken:		

UNIT-V : ENVIRONMENTAL MANAGEMENT

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.	Sustainable Development	1	23-12-2022		2	
2.	Climate disruption- Greenhouse effect, ozone layer depletion and acid rain. Stockholm conference	1	24-12-2022		2,3	
3.	Environmental Impact Assessment (EIA)		30-12-2022		2	
4.	Green building, Environmental Law		31-12-2022		2	
5.	II MID EXAMINATIONS		06-01-2023			
6.	II MID EXAMINATIONS	1	07-01-2023			
No. of classes required to complete UNIT-V: 04				No. of classes taken:		

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

TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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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.
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PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.
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PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. Shaheda Niloufer**	**Dr. Shaheda Niloufer**	**Dr. Shaheda Niloufer**	**Dr. A. Rami Reddy**
Signature				

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DEPARTMENT OF AEROSPACE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Ashutosh Shukla/Udaya Lakshmi
Course Name & Code **:** Strength of materials & 20AE52 **Regulation**: R20
L-T-P Structure **: 0-0-3** **Credits:** 1.5
Program/Sem/Sec : B.Tech/III **A.Y.:** 2023-24
Prerequisites: Engineering Mechanics and Strength of Materials
Course Educational Objectives: To learn the methods to predict the response of a structure under loading and it susceptibility to various failure modes

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

CO 1	Analyze the various materials under different equilibrium loading conditions. (Analyze-L4)
CO 2	Perform tests and analyze materials subjected to tension, torsion, bending, and bucking (Apply-L3)

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

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

PART-B
COURSE DELIVERY PLAN (LESSON PLAN)

Strength of Materials Lab
Batch-A (Tuesday)

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign Weekly
1.	Lab Demo (I-Cycle)	3	8-08-23		
2.	Experiment-I	3	22-08-23		
3.	Experiment-II	3	29-08-23		
4.	Experiment-III	3	05-09-23		
5.	Experiment-IV	3	12-09-23		
6.	Experiment-V	3	19-09-23		
7.	Lab Demo (II-Cycle)	3	26-09-23		
8.	Experiment-VI	3	03-10-23		
9.	Experiment-VII	3	10-10-23		
10.	Experiment-VIII	3	17-10-23		
11.	Experiment-IX	3	31-10-23		
12.	Experiment-X	3	07-11-23		
13.	Repetition Lab	3	14-11-23		
14.	Internal Test	3	21-11-23		
No. of classes required to complete: 14					

Batch-B (Thursday)

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign Weekly
1.	Lab Demo (I-Cycle)	3	10-08-23		
2.	Experiment-I	3	17-08-23		
3.	Experiment-II	3	24-08-23		
4.	Experiment-III	3	31-08-23		
5.	Experiment-IV	3	07-09-23		
6.	Experiment-V	3	14-09-23		
7.	Lab Demo (II-Cycle)	3	21-09-23		
8.	Experiment-VI	3	28-09-23		
9.	Experiment-VII	3	12-10-23		
10.	Experiment-VIII	3	26-10-23		
11.	Experiment-IX	3	02-11-23		
12.	Experiment-X	3	09-11-23		
13.	Repetition Lab	3	16-11-23		
14.	Internal Test	3	23-11-23		
No. of classes required to complete: 14					

PART-C

EVALUATION PROCESS (R17 Regulations):

Evaluation Task	Marks
Day to Day work = **A**	A=05
Record = **B**	B=05
Internal Test = **C**	C = 05
Cumulative Internal Examination : A + B + C = 15	**15**
Semester End Examinations = D	**D = 35**
Total Marks: A + B + C + D = 50	**50**
Day to Day work = **A**	A=05

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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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				
Signature				