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., VI-Sem., ASE

ACADEMIC YEAR : 2023-24

COURSE NAME & CODE : **FLIGHT DYNAMICS-20AE15**

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

COURSE CREDITS : 3

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

PRE-REQUISITES: Engineering Mechanics, Aerodynamics

Course Educational Objectives: To learn the concepts of performance estimation on steady level flight at various altitudes and velocities, performance of maneuvering flight at unaccelerated and accelerated conditions, the concepts of static stability requirements during flight, the basic concepts of dynamic stability and control of an aircraft.

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

CO1	To determine thrust and power requirement conditions for steady level flight (Apply-L3)
CO2	To estimate performance parameters of flight during manoeuvring (Apply-L3)
CO3	To apply the conditions of static stability and control in the aircraft design (Apply-L3)
CO4	To understand various concepts and conditions of dynamic stability and control (Understand-L2)

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
20AE09	CO1	3	2	2	2	-	-	-	-	-	-	-	3	3	3
	CO2	3	3	2	2	-	-	-	-	-	-	-	3	3	3
	CO3	3	3	2	3	-	-	-	-	-	-	-	3	3	3
	CO4	3	2	2	3	-	-	-	-	-	-	-	3	3	3
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 Aircraft Performance and Design, J.D Anderson, McGrawhill Education, 2017

T2 Nelson, R.C. "Flight Stability and Automatic Control", McGraw-Hill Book Co., 2017.

REFERENCE BOOKS:

R1 Perkins, C.D., and Hage, R.E., "Airplane Performance stability and Control", John Wiley & Son:, Inc, NY, 1988.

R2 Etkin, B., "Dynamics of Flight Stability and Control", Edn. 2, John Wiley, NY, 1982.

R3 Babister, A.W., "Aircraft Dynamic Stability and Response", Pergamon Press, Oxford, 1980.

R4 Michael V. Cook, "Flight Dynamics Principles", Second Edition, Elsevier Aerospace Engineering Series, 2007.

R5 Mc Cornick B. W, "Aerodynamics, Aeronautics and Flight Mechanics", John Wiley, NY, 1995.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: STEADY FLIGHT PERFORMANCE

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 Course and discussion of course outcomes (Cos)	1	4-12-2023		TLM1	
2.	Introduction to Aircraft Performance, Equations of motion of Steady level flight	1	6-12-2023		TLM1	
3.	Drag Polar	1	7-12-2023		TLM1	
4.	Thrust Required for Level Flight	1	8-12-2023		TLM1	
5.	Thrust Available and Maximum Velocity	1	11-12-2023		TLM1	
6.	Power required for level flight, Power available and maximum velocity	1	13-12-2023		TLM1	
7.	Altitude effects	1	14-12-2023			
8.	Effect of Drag Divergence	1	15-12-2023		TLM1	
9.	Tutorial	1	18-12-2023		TLM3	
10.	Assignment-1/Quiz-1				---	
No. of classes required to complete UNIT-I		**9**		**No. of classes taken:**		

UNIT-II: MANOEUVERING FLIGHT PERFORMANCE:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
11.	Rate of climb and climb performance parameter	2	20-12-2023. 21-12-2023		TLM1, TLM2	
12.	Hodograph Diagram ,Absolute and service ceiling, Time to climb	1	22-12-2023		TLM1	
13.	Gliding Flight	1	27-12-2023		TLM1	
14.	Tutorial	1	28-12-2023		TLM3	
15.	Range for propeller driven and jet propelled	1	29-12-2023		TLM1,TLM2	
16.	Endurance, Endurance for propeller driven and jet propelled	2	3-1-2024, 4-1-2024		TLM1,TLM2	
17.	Pull-Up and Pull-Down Manoeuvres	1	5-1-2024		TLM1, TLM2	
18.	Turning Flight, Constraints on load factor	1	8-1-2024		TLM1	
19.	V-n diagram	1	10-1-2024		TLM1, TLM2	
20.	Take-off performance	1	11-1-2024		TLM1	
21.	Landing performance	1	12-1-2024		TLM1	
22.	Tutorial	1	17-1-2024		TLM3	
23.	Assignment/Quiz-2				----	
No. of classes required to complete UNIT-II		**14**		**No. of classes taken:**		

I Mid Examination (29-01-2024 to 03-02-2024)

UNIT-III: STATIC LONGITUDINAL STABILITY AND CONTROL::

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.	Introduction, Moments on the airplane, Absolute angle of attack	1	18-1-2024		TLM1,TLM4	
25.	Criteria for longitudinal Stability	1	19-1-2024		TLM1	
26.	Wing contribution for longitudinal static stability	2	22-1-2024, 24-1-2024		TLM1	
27.	Tail contribution for longitudinal static stability	2	25-1-2024, 26-1-2024		TLM1, TLM2	
28.	Tutorial	1	5-2-2024		TLM3	

29.	Total pitching moment, Neutral point , Static margin	1	7-2-2024		TLM1	
30.	Stick fixed stability, Stick free stability, Longitudinal control	1	8-2-2024		TLM1	
31.	Elevator angle to trim, Elevator hinge moment	1	9-2-2024		TLM1	
32.	Power effects	1	12-2-2024		TLM1	
33.	Tutorial	1	14-2-2024		TLM3	
34.	Assignment/Quiz-3					
No. of classes required to complete UNIT-III		12		**No. of classes taken:**		

UNIT-IV: STATIC LATERAL-DIRECTIONAL STABILITY AND CONTROL:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
35.	Lateral stability-Dihedral effect, criterion for lateral stability	2	15-2-2024, 16-2-2024		TLM1	
36.	Dihedral effect, Adverse yaw effects	1	19-2-2024		TLM1,TLM5	
37.	Contribution of wing, fuselage, tail, Lateral control - Coupling between rolling and yawing moments	1	21-2-2024		TLM1	
38.	Lateral control-strip theory estimation of aileron effectiveness, aileron reversal.	1	22-2-2024		TLM1	
39.	Directional stability-yaw and sideslip, Criterion of directional stability, Contribution wing, fuselage, tail	1	23-2-2024		TLM1	
40.	Tutorial	1	26-2-2024		TLM3	
41.	Directional control-rudder control effectiveness	1	28-2-2024		TLM1	
42.	Rudder requirements-adverse yaw, asymmetric power condition, spin recovery	1	29-2-2024		TLM1	
43.	Rudder lock and Dorsal fin	1	1-3-2024		TLM1	
44.	Tutorial	1	4-3-2024		TLM3	
45.	Assignment/Quiz-4					
No. of classes required to complete UNIT-IV		11		**No. of classes taken:**		

UNIT-V: DYNAMIC STABILITY AND CONTROL:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
46.	Introduction to dynamic longitudinal stability, Modes of stability	1	6-3-2024		TLM1,TLM5	
47.	Aircraft Equations of motion	2	7-3-2024, 8-3-2024		TLM1	
48.	Small disturbance theory	2	11-3-2024, 13-3-2024		TLM1,TLM5	
49.	Solving the stability quartic, Routh's Discriminant	2	14-3-2024, 15-3-2024		TLM1	
50.	Phugoid motion, Short period of oscillation	1	18-3-2024		TLM1	
51.	Brief description of lateral and directional dynamic stability	2	20-3-2024, 21-3-2024		TLM1	
52.	Spiral divergence, Dutch roll, auto rotation and spin	2	22-3-2024, 25-3-2024		TLM1	
53.	Tutorial	1	27-3-2024		TLM3	
54.	Assignment/Quiz-5					
55.	Revision	2	28-3-2024, 29-3-2024		TLM2	
No. of classes required to complete UNIT-V		**15**		**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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DEPARTMENT OF AEROSPACE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. A. Revanth Reddy
Course Name & Code : ABP & 20AE16
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ASE., VI-Sem. A.Y : 2023-24

PRE-REQUISITE: Engineering Thermodynamics, Elements of Aerospace Engineering

COURSE EDUCATIONAL OBJECTIVES (CEOs): To learn engineering concepts of jet engines, flow through subsonic and supersonic inlets of a jet engine, principle of operation of aircraft jet engines, fundamentals of combustion process.

COURSE OUTCOMES (COs): At the end of the semester, students will be able

CO 1	To determine the performance parameters of various jet engines (Apply-L3)
CO 2	To analyze flow thorough subsonic and supersonic inlets (Analyze-L4)
CO 3	To estimate the performance parameters of aircraft compressor (Apply-L3)
CO 4	To identify the parameters governing the working of combustion chambers (Understand-L2)
CO 5	To determine the performance parameters of turbines of jet engines (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	3	2								2	3	2
CO2	3	3	3	2								2	3	2
CO3	3	3	3	2								2	3	2
CO4	3	3	3	2								2	3	2
CO5	2	2	2	2								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).

TEXT BOOKS:

T1 Ganesan. V, Gas Turbines, Third Edition, Tata McGraw-Hill, New Delhi, 2017

T2 Saravanamuttoo. H.I.H, Rogers. G. F. C, Cohen. H, Straznicky. P. V, Nix. A. C, Gas Turbine Theory, Seventh Edition, Pearson Education, 2019.

REFERENCE BOOKS:

R1 Hill, P.G., Peterson, C.R. Mechanics & Thermodynamics of Propulsion, Addison –

Wesley. Longman INC, 1999

R2 Mattingly. J. D, Elements of propulsion: Gas Turbines and Rockets, AIAA Educational Series

R3 Rolls Royce Jet Engine, Third Edition, 1983

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: FUNDAMENTALS OF AIRBREATHING 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
1.	Working of Gas Turbine Engine	1	04-12-23		TLM1	
2.	Characteristics of Turboprop	1	05-12-23		TLM1	
3.	Characteristics of Turbofan	1	08-12-23		TLM1	
4.	Characteristics of Turbojet	1	09-12-23		TLM1	
5.	Cycle Analysis	1	11-12-23		TLM1	
6.	Performance Characteristics	1	12-12-23		TLM1	
7.	Performance Characteristics (Cont)	1	15-12-23		TLM1	
8.	Performance Characteristics (Cont)	1	16-12-23		TLM1	
9.	Thrust Equation.	1	18-12-23		TLM1	
10.	Thrust Equation (cont)	1	19-12-23		TLM1	
11.	Factors Affecting Thrust	1	22-12-23		TLM1	
12.	Methods of Thrust Augmentation	1	23-12-23		TLM1	
13.	Introduction to Ramjets and Working Principle.	1	26-12-23		TLM1	
14.	Introduction to SCRAMJETS and Working Principle.	1	29-12-23		TLM1	
No. of classes required to complete UNIT-I: 14				No. of classes taken: 14		

UNIT-II: SUBSONIC AND SUPERSONIC INLETS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Introduction to Subsonic and Supersonic inlets	1	30-12-23		TLM1	
16.	Subsonic Inlets	1	02-01-24		TLM1	
17.	Internal Flows	1	04-01-24		TLM1	
18.	External Flows	1	05-01-24		TLM1	
19.	Supersonic Inlets	1	08-01-24		TLM1	
20.	Starting problem on Supersonic Inlets	1	09-01-24		TLM1	
21.	Shock Swallowing	1	10-01-24		TLM1	
22.	Flow Stability Problem	1	12-01-24		TLM3	
23.	Revision of the Unit II	1	17-01-24		TLM1	
No. of classes required to complete UNIT-II: 9				No. of classes taken: 9		

UNIT-III: COMPRESSORS

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.	Introduction to compressors	1	19-01-24		TLM1	
25.	Principle of Operation of Centrifugal Compressor	1	20-01-24		TLM1	
26.	Work Done and Pressure Rise	1	22-01-24		TLM1	
27.	Velocity diagrams	1	23-01-24		TLM1	
28.	Diffuser vane considerations	1	25-01-24		TLM2	
29.	Prewhirl, Stall and Surge	1	27-01-24		TLM1	
30.	Elementary theory of Axial Flow Compressor	1	05-02-24		TLM2	
31.	Velocity Triangles	1	06-02-24		TLM1	
32.	Velocity Triangles (Cont..)	1	09-02-24		TLM2	
33.	Degree of reactions	1	~~10-02-24~~		TLM1	
34.	Centrifugal compressor Performance Characteristics	1	12-02-24		TLM2	
35.	Axial compressor Performance Characteristics	1	13-02-24		TLM1	
36.	Numericals	1	16-02-24		TLM1	
No. of classes required to complete UNIT-III:13				No. of classes taken: 13		

UNIT-IV: COMBUSTION CHAMBERS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
37.	Classification of Combustion Chambers	1	17-02-24		TLM1	
38.	Combustion Process	1	19-02-24		TLM1	
39.	Combustion Process (cont..)	1	20-02-24		TLM1	
40.	Factors affecting CC design	1	23-02-24		TLM1	
41.	CC Performance	1	24-02-24		TLM1	
42.	CC Performance (cont..)	1	26-02-24		TLM3	
43.	Effect of Operating variables on Performance	1	27-02-24		TLM1	
44.	Effect of Operating variables on Performance	1	01-03-24		TLM1	
45.	Flame tube cooling	1	02-03-24		TLM1	
46.	Flame Stabilization	1	04-03-24		TLM1	
47.	Use of Flame Holders	1	05-03-24		TLM1	
48.	Fuel Injection Systems	1	07-03-24		TLM1	
49.	Revision of Unit IV	1	08-03-24		TLM1	
No. of classes required to complete UNIT-IV:15				No. of classes taken: 13		

UNIT-V: 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
50.	Elementary theory of Turbines	1	11-03-24		TLM1	
51.	Impulse Turbines	1	12-03-24		TLM1	

52.	Reaction Turbines	1	15-03-24		TLM1	
53.	Axial flow Turbines	1	16-03-24		TLM1	
54.	Radial flow Turbines	1	18-03-24		TLM1	
55.	Velocity triangles and Power output	1	19-03-24		TLM1	
56.	Velocity triangles and Power output (Cont..)	1	22-03-24		TLM1	
57.	Estimation of Stage Performance	1	23-03-24		TLM1	
58.	Estimation of Stage Performance (Cont..)	1	25-03-24		TLM1	
59.	Turbine Performance Characteristics	1	26-03-24		TLM1	
60.	Turbine Performance Characteristics	1	29-03-24		TLM1	
61.	Methods of Blade Cooling	1	30-03-24		TLM1	
No. of classes required to complete UNIT-V:12				No. of classes taken: 12		

Advanced Topics/ beyond Syllabus in MOC

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.						
2.						

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

PART-C

EVALUATION PROCESS (R20 Regulations):

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
(Dr. A Revanth Reddy)	(Dr. A Revanth Reddy)	(Dr.P.Lovaraju)

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

COURSE HANDOUTS

PROGRAM : B. Tech, VI Sem, Aerospace Engineering
ACADEMIC YEAR : 2023-2024
COURSE NAME AND CODE : 20AE17- INTRODUCTION TO COMPUTATIONAL
L-T-P STRUCUTRE : 3-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Dr. Sreenadh Chevula
COURSE COORDINAOTR : Dr. Sreenadh Chevula

PRE-REQISITE
Course educational objectives : To learn the basic governing equations of fluid dynamics, mathematical behaviour of partial differential equations, phenomena of various discretization techniques, techniques

COURSE OUTCOMES(Co's) **At the end of the course students are able to**

CO1	Formulate the governing equations of fluid dynamics (Apply-L3)
CO2	Apply the discretization techniques to governing equations of fluid dynamics (Apply-L3)
CO3	Understand various CFD techniques (Understand-L2)
CO4	Apply various CFD techniques to solve fluid dynamic problems (Apply-L3)

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

REFERENCES

T1. Anderson.J.D, Computational Fluid Dynamics-Basics with Applications, Mc Graw Hill, 2017.

T2. Anderson, D. A, Tannehill. J. C, Pletcher. R. H, Computational Fluid Mechanics and Heat Transfer, CRC Press, 2012.

T3. Patankar. S. V, Numerical Heat Transfer and Fluid Flow, CRC Press, 1980.

T4. Sengupta. T. K, Fundamentals of Computational Fluid Dynamics, University Press, 2004

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT - I Introduction, Governing Equations of Fluid Dynamics, Mathematical Behavior of Partial Differential Equations

s.No	Topics to be Covered	No of classes required	Tentative date of completion	Actual Date of completion	Teaching Learning method	Learning Outcomes	Textbook Followed	HoD Sign Weekly
1	**Computational Fluid Dynamics as a Research and Design Tool, Applications of Computational Fluid Dynamics.**	2	4,6, Dec,2023		**TLM2**	CO1	T1	
	Governing Equations of Fluid Dynamics:							
2	Introduction, Control Volume,	1	8 Dec,2023		**TLM2**	CO1	T1	
3	Substantial Derivative, Divergence of Velocity	1	09-Dec-23		**TLM2**	CO1	T1	
4	Continuity Equation	1	11-Dec-23		**TLM2**	CO1	T1	
5	Momentum Equation	2	13, 15-12-2023		**TLM2**	CO1	T1	
6	Energy Equation	2	16, 18-12-2023		**TLM2**	CO1	T1	
7	Conservation and non-conservation forms of governing flow equations	2	20, 22-12-2023		**TLM2**	CO1	T1	
	Mathematical Behavior of Partial Differential Equations:							
8	Introduction	2	23, 27-12-2023		**TLM2**	CO1	T1	
9	Classification of Quasi-Linear Partial Differential Equations	2	29, 30-12-2023		**TLM2**	CO1	T1	
10	Eigen Value Method,	2	1,3-01-2024		**TLM2**	CO1	T1	
11	Hyperbolic Equations	2	5,6-01-2024		**TLM2**	CO1	T1	
12	Parabolic Equations	1	08-Jan-24		**TLM2**	CO1	T1	
14	Elliptic Equations	1	10,12-01-2023		**TLM2**	CO1	T1	
Total No of classes required to complete Unit-1		19	No of Classes Taken :					

UNIT - 2 Basics Aspects of Discretization

s.No	Topics to be Covered	No of classes required	Tentative date of completion	Actual Date of completion	Teaching Learning method	Learning Outcomes	Text Book Followed	HoD Sign Weekly
1	Introduction,	1	17-01-2024		**TLM2**	CO2	T1	
2	Introduction of Finite Differences,	2	19,20-01-2024		**TLM2**	CO2	T1	
3	Difference Equations,	2	22,24-01-2024		**TLM2**	CO2	T1	
4	Explicit Approaches	2	27,29-01-2024		**TLM2**	CO2	T1	
5	Implicit Approaches	2	5,7-02-2024		**TLM2**	CO2	T1	
6	Errors and Stability Analysis	3	9,10,12-02-2024		**TLM2**	CO2	T1	
7	Grid Generation	1	14-Feb-24					
	Total No of classes required to complete Unit-2	13	No of Clasess Taken :					

29-01-2024 to 03-2-2024 MID-1 Examination

UNIT - 3 Simple CFD Techniques

s.No	Topics to be Covered	No of classes required	Tentative date of completion	Actual Date of completion	Teaching Learning method	Learning Outcomes	Text Book Followed	HoD Sign Weekly
1	Introduction	1	16-Feb-24		**TLM2**	CO3	T1	
2	The Lax–Wendroff method	2	17,19-02-2024		**TLM2**	CO3	T1	
3	Maccormack technique	2	21,23-02-2024		**TLM2**	CO3	T1	
4	Space Marching	1	24-Feb-24		**TLM2**	CO3	T1	
5	Relaxation Technique and its use with low-speed inviscid Flow	2	26,28-02-2024		**TLM2**	CO3	T1	
6	Artificial Viscosity	2	01,02-03-2024		**TLM2**	CO3	T1	
	Total No of classes required to complete Unit-3	10						

UNIT - 4 Numerical Solutions of Quasi 1-D Nozzle Flows:

s.No	Topics to be Covered	No of classes required	Tentative date of completion	Actual Date of completion	Teaching Learning method	Learning Outcomes	Text Book Followed	HoD Sign Weekly
1	Introduction	1	04-Mar-24		**TLM2**	CO4	T1	
2	Supersonic Isentropic Nozzle	2	6,8-03-2024		**TLM2**	CO4	T1	
3	Maccormack technique	1	9,11-03-2024		**TLM2**	CO4	T1	
4	Governing Equations	2	13,15-03-2024		**TLM2**	CO4	T1	
5	Finite Difference Equations	2	16,18-03-2024		**TLM2**	CO4	T1	
6	CFD Solution of Purely Subsonic Isentropic Nozzle Flow	2	20,22-03-2024		**TLM2**	CO4	T1	
7	Shock Capturing	2	23,25-03-2024		**TLM2**	CO4	T1	
	Total No of classes required to complete Unit-4	12						

UNIT - 5 Incompressible Couette Flow:

s.No	Topics to be Covered	No of classes required	Tentative date of completion	Actual Date of completion	Teaching Learning method	Learning Outcomes	Text Book Followed	HoD Sign Weekly
1	Introduction,	1	27-Mar-24		**TLM2**	CO5	T1, T2	
2	The Physical Problem and its exact Analytical Solution	3	29, 30-03-2024		**TLM2**	CO5	T1, T2	

01-04-2024 to 06-4-2024 MID-II Examination

s.No	Topics to be Covered	No of classes required	Tentative date of completion	Actual Date of completion	Teaching Learning method	Learning Outcomes	Text Book Followed	HoD Sign Weekly
3	Implicit Crank-Nicholson Technique	2	8,10 Apr 2023		**TLM2**	CO5	T1, T2	
4	Pressure Correction Method	3	10,12, 13 Apr 2023		**TLM2**	CO5	T1, T2	
	Total No of classes required to complete Unit-5	9						

15-04-2024 to 27-04-2024 Semester end examination

Teaching Learning Method

TLM2 PPT and Chalk and Talk

DEPARTMENT OF MECHANICAL ENGINEERING
COURSE HANDOUT

Part-A

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

ACADEMIC YEAR : 2023-24

COURSE NAME & CODE : ELEMENTS OF HEAT TRANSFER-20AE14

L-T-P STRUCTURE : 4-0-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : K. Lakshmi Prasad

COURSE COORDINATOR : K. Lakshmi Prasad

PRE-REQUISITES: Engineering Fluid Mechanics, Engineering Thermodynamics.

COURSE EDUCATIONAL OBJECTIVES (CEOs): To learn the basic differential equations of heat transfer in conduction, convection, radiation and to understand the LMTD concepts used in heat exchangers.

COURSE OUTCOMES (COs)

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

CO1: To formulate heat conduction phenomenon through plane, cylindrical surfaces (Apply L3)

CO2: To analyze steady state heat conduction in planes walls and cylindrical shells (Analyze-L4)

CO3: To analyze the convective heat transfer phenomenon in both external and internal flows (Analyze-L4)

CO4: To understand the thermal radiation concepts (Understand-L2)

CO5: To apply the heat transfer principles on the working of heat exchangers and electronic equipment (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	2	2	2	-	-	-	-	-	-	-	2	3	3
CO2	3	2	3	2	-	-	-	-	-	-	-	2	3	3
CO3	3	3	2	3	-	-	-	-	-	-	-	2	3	3
CO4	3	1	2	2	-	-	-	-	-	-	-	2	3	3
CO5	3	3	3	3	-	-	-	-	-	-	-	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).

BOS APPROVED TEXT BOOKS:

T1 Sachdeva. R.C, Fundamentals of Engineering Heat and Mass Transfer, Fifth Edition, New Age Intl. Publishers, 2015.

BOS APPROVED REFERENCE BOOKS:

R1 Rathakrishnan. E, Elements of Heat transfer CRC press, New York, 2012.

R2 Yunus A. Cengel, Afshin J. Ghajar, Heat and Mass Transfer: Fundamentals and Applications McGraw-Hill, 2020.

R3 Holman. J.P, Heat transfer, McGraw-Hill Higher Education, 2010.

R4 Ghoshdastidar. P.S, Heat Transfer, Oxford University Press, 2012.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: CONDUCTIVE HEAT TRANSFER:

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.	Course Outcomes & Blooms Taxonomy Levels	1	04.12.23		**TLM1/ TLM2**			
2.	Introduction	2	05.12.23 06.12.23		**TLM1/ TLM2**	CO1	T1	
3.	Heat Conduction-Fourier Law of Heat Conduction, Thermal Conductivity.	2	07.12.23 11.12.23		**TLM1/ TLM2**	CO1	T1	
4.	General Heat Conduction Equation in Cartesian Co-ordinates.	1	12.12.23		**TLM1/ TLM2**	CO1	T1	
5.	General Heat Conduction Equation in Cylindrical Co-ordinates.	1	13.12.23		**TLM1/ TLM2**	CO1	T1	
6.	Problems	4	**14.12.23** **18.12.23** **19.12.23** **20.12.23**		**TLM1**	CO1	T1	
7.	**Quiz/Assignment**							
No. of classes required to complete UNIT-I		11			No. of classes taken:			

UNIT-II: ONE-DIMENSIONAL STAEDY STATE CONDUCTION:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
8.	Heat Conduction in Plane Wall with Constant Thermal Conductivity	1	21.12.23		**TLM1/ TLM2**	CO2	T1	
9.	Heat Flow Through Composite Wall	1	26.12.23		**TLM1/ TLM2**	CO2	T1	
10.	Electrical Analogy	1	27.12.23		**TLM1/ TLM2**	CO2	T1	

11.	Thermal Resistance				**TLM1/ TLM2**	CO2	T1	
12.	Heat Conduction in Cylindrical shell with Constant Thermal Conductivity	1	28.12.23		**TLM1/ TLM2**	CO2	T1	
13.	Heat Flow Through Cylinder.	1	02.01.24		**TLM1/ TLM2**	CO2	T1	
14.	Critical thickness of Insulation	1	03.01.24		**TLM1/ TLM2**	CO2	T1	
15.	Uniform Internal Heat Generation in Slab	1	04.01.24		**TLM1/ TLM2**	CO2	T1	
16.	Extended Surfaces	2	**08.01.24 09.01.24**		**TLM1/ TLM2**	CO2	T1	
17.	Problems	3	**10.01.24 11.01.24 17.01.24**		**TLM1**	CO2	T1	
18.	**Quiz/Assignment**					CO2		
No. of classes required to complete UNIT-II		12			No. of classes taken:			

UNIT-III: CONVECTIVE HEAT TRANSFER:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
19.	Introduction-Types of Convection	1	18.01.24		**TLM1/ TLM2**	CO3	T1, R8	
20.	Convective Heat Transfer Coefficient	1	22.01.24		**TLM1/ TLM2**	CO3	T1	
21.	Significance of Non-Dimensional Numbers	2	23.01.24 24.01.24		**TLM1/ TLM2**	CO3	T1	
22.	Convective Boundary Layers	1	25.01.24		**TLM1/ TLM2**	CO3	T1	
23.	The Convection Heat Transfer Equations	1	05.02.24		**TLM1/ TLM2**	CO3	T1	
24.	Velocity Boundary Layer, Thermal Boundary Layer	1	06.02.24		**TLM1/ TLM2**	CO3	T1	
25.	Thermal Boundary Layer for Flow Past Heated Plate	1	07.02.24		**TLM1/ TLM2**	CO3	T1	
26.	Free Convection	2	08.02.24 12.02.24		**TLM1/**	CO3	T1	

					TLM2			
27.	Problems	4	13.02.24 14.02.24 15.02.24 19.02.24		**TLM1/ TLM2**	CO3	T1	
28.	**Quiz/Assignment**					CO3		
No. of classes required to complete UNIT-III		14			No. of classes taken:			

UNIT-IV: THERMAL RADIATION:

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.	Introduction-Nature of Thermal Radiation	1	20.02.24		**TLM1/ TLM2**	CO4	T1	
30.	Concept of Black Body –Laws of Black Body Radiation-	2	21.02.24 22.02.24		**TLM1/ TLM2**	CO4	T1	
31.	Radiation Heat Exchange Between Two Black Isothermal Surfaces	1	26.02.24		**TLM1/ TLM2**	CO4	T1	
32.	View Factor	1	27.02.24		**TLM1/ TLM2**	CO4	T1	
33.	Heat Exchange Between Non-Black Infinite Parallel Plates	1	28.02.24		**TLM1/ TLM2**	CO4	T1	
34.	Radiation Shields	2	29.02.24 04.03.24		**TLM1/ TLM2**	CO4	T1	
35.	Simple Problems	2	05.03.24 06.03.24		**TLM1**	CO4	T1	
36.	**Quiz/Assignment**					CO4		
No. of classes required to complete UNIT-IV		10			No. of classes taken:			

UNIT-V: APPLICATIONS: HEAT EXCHANGERS & COOLING OF ELECTRONIC EQUIPMENT

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
37.	**HEAT EXCHANGERS:** Introduction-Classification of Heat Exchangers	1	07.03.24		**TLM1/ TLM2**	CO5	T1	
38.	Overall Heat Transfer Coefficient-Fouling Factor	1	11.03.24		**TLM1/ TLM2**	CO5	T1	
39.	LMTD Method of	2	12.03.24 13.03.24		**TLM1/**	CO5	T1	

	Heat Exchanger Analysis				**TLM2**			
40.	Manufacturing of Electronic Equipment, Cooling Load of Electronic Equipment	1	14.03.24		**TLM1/ TLM2**	CO5	T1	
41.	Thermal Environment	1	18.03.24		**TLM1/ TLM2**	CO5	R2	
42.	Electronics Cooling in Different Applications,	1	19.03.24		**TLM1/ TLM2**	CO5	R2	
43.	Conduction Cooling, Air Cooling:	1	20.03.24		**TLM1/ TLM2**	CO5	R2	
44.	Forced Convection, Fan Selection	1	21.03.24		**TLM1/ TLM2**	CO5	R2	
45.	Cooling Personal Computers, Liquid Cooling, Immersion Cooling	1	25.03.24		**TLM1/ TLM2**	CO5	R2	
46.	,Problems	3	26.03.24 27.03.24 28.03.24		**TLM1/ TLM2**	CO5	R2	
47.	**Quiz/Assignment**					CO5		
No. of classes required to complete UNIT-V		13			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
1	One Dimensional transient heat conduction- Heat flow through the plane wall and cylinder with variable thermal conductivity	2	27.03.24 28.03.24		**TLM1/ TLM2**	CO2	R2	

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 Calender-A.Y-2023-24

Description	From	To	Weeks
B Tech VI Semester			
Commencement of class work	04.12.2023		
I phase of Instructions	04.12.2023	27.01.2024	8
I Mid Examination	29.01.2024	03.02.2024	1
II phase of Instructions	**05.02.2024**	**30.03.2024**	**8**
II Mid Examination	01.04.2024	06.04.2024	1
Preparation and Practical	**08.04.2024**	**13.04.2024**	**1**
Semester End Examination	15.04.2024	27.04.2024	2
Internship	**29.04.2024**	**22.06.2024**	**8**

Part - C

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment 1	1	A1=5
Assignment 2	2	A2=5
I-Mid Examination	1,2,3	B1=15
Quiz – 1	1,2,3	Q1=10
Assignment 3	3	A3=5
Assignment 4	4	A4=5
Assignment 5	5	A5=5
II-Mid Examination	3,4,5	B2=15
Quiz – 2	3,4,5	Q2=10
Evaluation of Assignment: A=(A1+A2+A3+A4+A5)/5	1,2,3,4,5	A=5
Evaluation of Mid Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=15
Evaluation of Quiz Marks: Q=75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	1,2,3,4,5	Q=10
Cumulative Internal Examination: A+B+Q	**1,2,3,4,5**	**CIE=30**
Semester End Examinations	**1,2,3,4,5**	**SEE=70**
Total Marks: CIE+SEE	**1,2,3,4,5**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

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

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

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

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

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

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

PSOs

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. K Lakshmi Prasad	Mr. K Lakshmi Prasad	Dr. P. Vijay Kumar	Dr. M B S Sreekar Reddy

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION

COURSE HANDOUT

PART-A

Name of Course Instructor : M.Sivasankara Rao
Course Name & Code : ELEMENTS OF COMMUNICATION SYSTEMS - 20EC82
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., ASE., VI-Sem., A.Y : 2023-24

PRE-REQUISITE: Concept of signals and modulation theory.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on fundamental properties of systems, radio transmitters, receivers, and noise present in the communication channel and transmission lines and antennas used in communication systems.

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

CO 1	**Summarize** the properties of systems and concepts of noise in communication systems. (Understand-L2).
CO 2	**Outline** the concepts of communication system, transmission lines, antennas, and response of linear systems (Understand-L2).
CO 3	**Apply** the knowledge of systems, transmission and reception concepts for communication systems in the presence of noise. (Apply-L3).
CO 4	**Interpret** the response of linear systems and performance of RF transmitters, receivers, transmission lines and antennas (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	PS O1	PS O2	PS O3
CO1	3	-	1	-	-	-	-	-	-	-	-	2	3	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	2	3	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	2	3	-	-
CO4	3	1	-	2	-	-	-	-	-	-	-	2	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:

1. Simon Haykin, Communication Systems, Second Edition, John Wiley & Sons Publications, Singapore, 1983.
2. Kennedy, Davis, Electronic Communication Systems, 4th edition, Tata McGraw-Hill Publications, 2009.

REFERENCE BOOKS:

1. Herbert Taub , Donald L. Schilling, "Principles of Communication Systems", Second Edition, Tata McGraw-Hill, New Delhi, 1991.
2. B.P.Lathi, "Modern Digital and Analog Communication Systems", Third Edition, Oxford University.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Systems:

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.	Course Objectives	1	05-12-2023		TLM1	
2.	Brief introduction about the course and its importance.	1	07-12-2023		TLM1	
3.	Introduction to Systems - Definition	1	08-12-2023		TLM1	
4.	Classification of systems	1	09-12-2023		TLM1	
5.	Properties of systems – Linear and Non - linear	1	12-12-2023		TLM1	
6.	Time invariant and time variant	1	14-12-2023		TLM1	
7.	Causal and Non-causal	1	15-12-2023		TLM1	
8.	Stable and Unstable	1	16-12-2023		TLM1	
9.	Signal and system bandwidth, Revision	1	19-12-2023		TLM1	
10.	Problems based on properties	1	21-12-2023		TLM1	
No. of classes required to complete UNIT-I: 10				No. of classes taken:		

UNIT-II: Response of linear systems:

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	22-12-2023		TLM1	
2.	Transfer function	1	23-12-2023		TLM1	
3.	Impulse response	1	26-12-2023		TLM1	
4.	Distortion less transmission through a system	1	28-12-2023		TLM1	
5.	Transmission of a signal through LTI system	1	29-12-2023		TLM1	
6.	Elements of communication system and its description	1	30-12-2023		TLM1	
7.	Revision	1	02-01-2024		TLM1	
No. of classes required to complete UNIT-II: 7				No. of classes taken:		

UNIT-III: Noise in Communication Systems:

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.	Concepts	1	04-01-2024		TLM1	
2.	External Noise	1	05-01-2024		TLM1	
3.	Internal noise	1	06-01-2024		TLM1	
4.	White Noise, Band limited white noise	1	09-01-2024		TLM1	
5.	Colored noise	1	11-01-2024		TLM1	
6.	Noise Calculations, noise figure	1	12-01-2024		TLM1	
7.	Noise temperature, Noise equivalent bandwidth	2	18-01-2024 19-01-2024		TLM1	
8.	Narrow band noise and its mathematical representation	2	20-01-2024 23-01-2024		TLM1	
9.	Power spectral density of in phase and quadrature components of noise	2	25-01-2024 27-01-2024		TLM1	
10.	Revision	1	06-02-2024		TLM1	
No. of classes required to complete UNIT-III: 13				No. of classes taken:		

UNIT-IV : Radio Transmitters and Receivers

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.	Radio Transmitters : AM Transmitter	2	08-02-2024 09-02-2024		TLM1	
2.	FM Transmitter – Direct method of FM Transmission	1	10-02-2024		TLM2	
3.	Indirect method of FM transmission	1	13-02-2024		TLM1	
4.	Radio Receivers : Types of Radio receivers	2	15-02-2024 16-02-2024		TLM1	
5.	TRF Receiver and its limitations	1	17-02-2024		TLM1	
6.	Super heterodyne receiver	2	20-02-2024 22-02-2024		TLM2	
7.	Revision	1	23-02-2024		TLM1	
No. of classes required to complete UNIT-IV: 10				No. of classes taken:		

UNIT-V : Transmission lines and Antennas

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.	Transmission lines : Fundamentals	1	24-02-2024		TLM1	
2.	Characteristic Impedance	1	27-02-2024		TLM1	
3.	Losses in transmission lines, Standing waves	2	29-02-2024 01-03-2024		TLM2	
4.	Quarter and half wavelength lines	2	02-03-2024 05-03-2024		TLM1	
5.	Reactance properties	2	07-03-2024 09-03-2024		TLM1	
6.	Antennas : Basics	1	12-03-2024		TLM1	
7.	Directional high frequency Antennas : Dipole Arrays	2	14-03-2024 15-03-2024		TLM1	
8.	Folded Dipole and applications	2	19-03-2024		TLM2	
9.	UHF and Microwave Antennas : Antennas with Parabolic reflectors	1	21-03-2024		TLM2	
10.	Horn Antennas, Lens Antennas	2	22-03-2024 23-03-2024		TLM1	
11.	Revision	1	26-03-2024		TLM1	
No. of classes required to complete UNIT-V: 17						

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 Digital Communication Techniques	1	28-03-2024			
2.	Introduction to the Advanced Communication systems	1	30-03-2024			

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

PART-C

EVALUATION PROCESS (R17 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=20
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. M.Sivasankara Rao	Mr. M.Sivasankara Rao	Dr. M. V. Sudhakar	Dr. Y. Amar Babu

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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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. S. Indrasena Reddy /Mr. Nazumuddin Shaik

Course Name & Code: Aircraft Component Modeling and Analysis Lab - 20AE60 **Regulation**: R20

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

Program/Sem/Sec **:** B.Tech/VI-SEM **A.Y.:** 2023-24

PRE-REQUISITES: Engineering workshop

COURSE EDUCATIONAL OBJECTIVES (CEOs):

To learn modeling package (CATIA) to draw 3D parts and Assembly of various aircraft components, and finite element package (ANSYS) to analyze the behavior of simple structural elements under static loading system.

COURSE OUTCOMES (COs): After completion of the course students are able to:

CO1	Draw aircraft components 3D geometric modeling. (Apply-L2)
CO2	Solve and analyze the structural components of aircraft for deformations and stresses using a numerical tool. (Analyze-L4)

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered. (Experiment Name)	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	ACMA Introduction-CATIA Introduction	07-12-23		TLM4	
2.	Aircraft Component Modeling-I	14-12-23		TLM4	
3.	Aircraft Component Modeling -II	21-12-23		TLM4	
4.	Aircraft Component Modeling –III(Wing)	04-01-24		TLM4	
5.	Landing Gear Parts	11-01-24		TLM4	
6.	Assembly of Landing Gear	18-01-24		TLM4	
7.	Assembly (Knuckle Joint)	25-01-24		TLM4	
8.	Introduction to ANSYS	08-02-24		TLM4	
9.	Static analysis on beam	15-02-24		TLM4	
10.	Eigenvalue Buckling analysis	22-02-24		TLM4	
11.	Model analysis on Wing	29-02-24		TLM4	
12.	Model analysis of Fuselage	07-03-24		TLM4	
13.	Thermal analysis	14-03-24		TLM4	
14.	Static analysis of composite laminate	21-03-24		TLM4	
15.	Repetition	28-03-24		TLM4	
16.	Lab internal Exam	04-04-24		TLM4	

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=05
Record = **B**	1,2,3,4,5,6,7,8	B=05
Internal Test = **C**	1,2,3,4,5,6,7,8	C = 05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8	**D = 35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8	**50**

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): Engineering Graduates will be able to:

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 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.
PO 5	**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.
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 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 the Aerospace vehicle design
PSO 2	To prepare the students to work effectively in Aerospace and Allied Engineering organizations

Course Instructor (S.Indrasena Reddy)	Module Coordinator (S.Indrasena Reddy)	Head of the Department (Dr.P.Lovaraju)

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FRESHMAN ENGINEERING DEPARTMENT
COURSE HANDOUT
PART-A

Name of Course Instructor : **B Sagar**
Course Name & Code : Soft Skills & 20HSS1
L-T-P Structure : 1-0-2 **Credits:** 02
Program/Sem/Sec : B. Tech- VI SEM-ASE
Academic Year : 2023-24

PREREQUISITE : NIL

Course Educational Objectives:

The Soft Skills Laboratory course equips students with required behavioral, interpersonal & Intrapersonal skills, communication skills, leadership skills etc. It aims at training undergraduate students on soft skills leading to enhanced self-confidence, esteem, and acceptability in professional circles.

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

CO1	To Develop self-awareness and personality traits for professional growth.	L2
CO2	Work effectively in multi-disciplinary and heterogeneous teams through knowledge of teamwork, Inter-personal relationships, conflict management and leadership quality.	L3
CO3	Communicate through verbal/oral communication with good listening skills and empathy.	L3
CO4	Apply skills required to qualify in recruitment tests, Interviews & other professional assignments.	L3

COURSE ARTICULATION MATRIX
(Correlation between COs & POs)

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

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

List of Activities:

1.Personality Development Skills

Role of language in Personality – How language reflects, impacts Personality – Using gender- neutral language in MNCs – being Culturally-Sensitive-Personality Traits - Grooming & Dress code

Activities: Group Discussion/Role play/Presentations (authentic materials: Newspapers, pamphlets and News Clippings)

2.Impactful Communication

Activities: Extempore / Story Telling/ Group Discussion (Case studies/Current affairs etc.)/ Elocution on Interpretation of given quotes/ Critical Appreciation and Textual Analysis/ Writing reviews on short story/videos/book/Social Media profiling/ Pronunciation Practice

3.Professional Skills:

Career Planning- job vs. career- goal setting- SWOT Analysis-Time management – self-management – stress-management.

Activities: SWOT analysis of the self/Goal Setting-Presentation/Writing Report/Listening exercises/Effective Resume-Writing and presentation/ Interview Skills: Mock interviews/Video samples.

REFERENCES:

1. Edward Holffman, "Ace the Corporate Personality", McGraw Hill,2001
2. Adrian Furnham, Personality and Intelligence at Work, Psyc 2. hology Press, 2008.
3. M.Ashraf Rizvi, "Effective Technical Communication", 1 st edition, Tata cGrawHill, 2005.
4. Ace of Soft skills Gopalaswamy Ramesh, Pearson Education India, 2018
5. Soft Skills for the Workplace, Good heart - Willcox Publisher · 2020.
6. How to Win Friends and Influence People, Dale Carnegie · 2020

Software: Walden InfoTech

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	HOD Sign weekly
1.	Activity-1:Role of language in Personality- How language reflects, impacts Personality – Using gender	1+2	06-12-23		TLM-1, 2& 6.	
2.	Neutral language in MNCs – being Culturally-Sensitive-Personality Traits - Grooming & Dress code& Role-play	1+2	13-12-23		TLM-1, 2 &6.	

3.	Group Discussion	1+2	20-12-23		TLM-1, 2& 6.	
4.	Group Discussion	1+2	27-12-23		TLM-1, 2& 6.	
5.	Presentations	1+2	03-01-24		TLM-1, 2& 6.	
6.	Activity-2: Impactful Communication Extempore - Story Telling	1+2	10-01-24		TLM-1, 2& 6.	
7.	Extempore -Group Discussion	1+2	17-01-24		TLM-1, 2& 6.	
8.	Elocution on Interpretation of given quotes/ Critical Appreciation and Textual Analysis/ Writing	1+2	24-01-24		TLM-1, 2& 6.	
9.	Reviews on short story/videos/book/Social Media profiling/ Pronunciation Practice	1+2	07-02-24		TLM-1, 2& 6.	
10.	Activity-3: Professional Skills: Career planning- job vs. career-goal setting	1+2	14-02-24		TLM-1, 2& 6.	
11.	SWOT Analysis	1+2	21-02-24		TLM-1, 2& 6.	
12.	Time management – self-management – stress-management.	1+2	28-02-24		TLM-1, 2& 6.	
13.	Presentation/Writing Report/Listening exercises	1+2	06-03-24		TLM-1, 2& 6.	
14.	Effective Resume-Writing and presentation	1+2	13-03-24		TLM-1, 2& 6.	
15.	Interview Skills: Mock interviews/Video samples.	1+2	20-03-24		TLM-1, 2& 6.	
16.	Interview Skills: Mock interviews/Video samples.	1+2	27-03-24		TLM-1, 2& 6.	
No. of classes required to complete Syllabus: 48						

Commented [P1]:

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

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	B Sagar	Dr. R. Padma Venkat	Dr. R. Padma Venkat	Dr. A. Ramireddy
Signature				

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DEPARTMENT OF AEROSPACE ENGINEERING

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COURSE HANDOUT

Part-A

PROGRAM : B.Tech.VI-Sem.,

ACADEMIC YEAR : 2023-24

COURSE NAME & CODE : Aircraft Design Lab-20AE58

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

COURSE CREDITS : 1.5

COURSE INSTRUCTORS : Mr. Ashutosh Shukla / Dr.Sreenadh Chevula

COURSE COORDINATOR : Mr. Ashutosh Shukla

PRE-REQUISITE: Aircraft performance

Course Educational Objectives: To learn the aircraft design methodologies.

Course Outcomes: At the end of the semester, the student will be able to
CO1: To design an aircraft system, component, or process as per the requirement
CO2: To design an aircraft as per the assigned specifications

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

TIME TABLE

Name of Course Instructor: Ashutosh Shukla/Dr.Sreenadh Chevula

Course Name & Code : AIRCRAFT DESIGN Lab – 20AE58 **Regulation**: R20

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

Program/Sem/Sec **:** B.Tech/VI-SEM **A.Y.:** 2023-24

DAY	1 9.00 to 09.50	2 09.50 to 10.40	3 11.00 to 11.40	4 11.40 to 12.30	LUNCH	5 01.30 to 02.20	6 02.20 to 03.10	7 03.10 to 04.00
MON						AD LAB (Batch A)		
TUE								
WED								
THU								
FRI						AD LAB(Batch B		
SAT								

LAB IN-CHARGE **HOD**

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Batch A

S.No	Tentative Date of Completion	Actual Date of Completion	Topics to be covered / List of Experiments		Learning Outcome COs
1	4-12-23		Exp-1	Aircraft conceptual sketch	CO1
2	11-12-23		Exp-2	Preliminary weight estimation	CO1
3	18-12-23		Exp-3	Jet fighter, twin turboprop	CO1
4	8-1-24		Exp-4	Sailed powered, Jet tainer	CO1
5	22-1-24		Exp-5	Estimate the Critical Mach number for an Airfoil	CO2
6	29-1-24		Exp-6	Static Performance: Thrust required curve	CO2
7	12-2-24		Exp-7	Static Performance: Power curve	CO2
8	19-2-24		Exp-8	Induced Drag estimation	CO2
9	26-2-24		Exp-9	Preliminary design of aircraft	CO2
10	4-3-24		Exp-10	Trade off study on range	CO2
15	11-3-24		Exp-11	Trade off study on payload	CO2
16	18-3-24		Exp-12	Drawing all 3 view of a aircraft	CO2
17	1-4-24			Internal exam	

COURSE DELIVERY PLAN (LESSON PLAN): Batch B

S.No	Tentative Date of Completion	Actual Date of Completion	Topics to be covered / List of Experiments		Learning Outcome COs
1	8-12-23		Exp-1	Aircraft conceptual sketch	CO1
2	15-12-23		Exp-2	Preliminary weight estimation	CO1
3	22-12-23		Exp-3	Jet fighter, twin turboprop	CO1
4	29-12-23		Exp-4	Sailed powered, Jet tainer	CO1
5	5-01-24		Exp-5	Estimate the Critical Mach number for an Airfoil	CO2
6	12-1-24		Exp-6	Static Performance: Thrust required curve	CO2
7	2-02-24		Exp-7	Static Performance: Power curve	CO2
8	16-02-24		Exp-8	Induced Drag estimation	CO2

9	23-02-24		Exp-9	Preliminary design of aircraft	CO2
10	01-03-24		Exp-10	Trade off study on range	CO2
15	15-03-24		Exp-11	Trade off study on payload	CO2
16	22-03-24		Exp-12	Drawing all 3 view of a aircraft	CO2
17	29-03-24			Internal exam	

Contents beyond the Syllabus:

15				
16				

Part - C

EVALUATION PROCESS:

Parameter		**Marks**
Day – to – Day Work	Observation	A1 = 10 Marks
	Record	A2 = 10 Marks
Internal Test		B =10 Marks
Attendance		C = 05 Marks
Viva – Voce During Regular Lab Sessions		D = 05 Marks
Cumulative Internal Examination		**A1+ A2 + B+C+D = 40 Marks**
Semester End Examinations		**E = 60 Marks**
Total Marks: A1+ A2 + B + C + D + E		**100 Marks**

Program Educational Objectives (PEO)

PEO1: To provide students with a solid foundation in mathematical, scientific and engineering fundamentals required to solve engineering problems.

PEO2: To train students with good scientific and engineering breadth so as to comprehend, analyze, design, and create novel products and solutions for the real life problems.

PEO3: To prepare students to excel in competitive examinations, postgraduate programs, advanced education or to succeed in industry/technical profession .

PEO4: To inculcate in students professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach, and an ability to relate engineering issues to broader social context.

PEO5: To provide student with an academic environment with awareness of excellence, leadership, and the life-long learning needed for a successful professional career.

PROGRAM OUTCOMES (POs)

Engineering Graduated 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 the defense and space research programs.

Ashutosh shukla	Dr. P.Lovaraju
Course Instructor	HOD