

SEMESTER VII / VIII*

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	AE3701	Wind Tunnel Techniques	PCC	3	0	0	3	3
2.	GE3751	Human Values and Ethics	HSMC	2	0	0	2	2
3.		Elective – Management [#]	HSMC	3	0	0	3	3
4.		Open Elective – II ^{**}	OEC	3	0	0	3	3
5.		Open Elective – III ^{***}	OEC	3	0	0	3	3
6.		Open Elective – IV ^{***}	OEC	3	0	0	3	3
PRACTICALS								
7.	AE3711	Aero Engine and Airframe Laboratory	PCC	0	0	2	2	1
8.	AE3712	Aircraft Systems Laboratory	PCC	0	0	2	2	1
9.	AE3781	Computational Analysis Laboratory	PCC	0	0	2	2	1
TOTAL				17	0	6	23	20

*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.

**Open Elective – II shall be chosen from the emerging technologies.

***Open Elective III and IV (Shall be chosen from the list of open electives offered by other Programmes)

Elective - Management shall be chosen from the elective Management courses

SEMESTER VIII / VII*

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICALS								
1.	AE3811	Project Work /Internship	EEC	0	0	20	20	10
TOTAL				0	0	20	20	10

*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII

PROGRESS THROUGH KNOWLEDGE

TOTAL CREDITS: 166

Attested

OPEN ELECTIVES

(Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories).

**OPEN ELECTIVE I AND II
(EMERGING TECHNOLOGIES)**

To be offered other than Faculty of Information and Communication Engineering

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OCS351	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2.	OCS352	IoT Concepts and Applications	OEC	2	0	2	4	3
3.	OCS353	Data Science Fundamentals	OEC	2	0	2	4	3
4.	CCS333	Augmented Reality /Virtual Reality	OEC	2	0	2	4	3

OPEN ELECTIVES – III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OHS351	English for Competitive Examinations	OEC	3	0	0	3	3
2.	OMG352	NGOs and Sustainable Development	OEC	3	0	0	3	3
3.	OMG353	Democracy and Good Governance	OEC	3	0	0	3	3
4.	OCE353	Lean Concepts, Tools And Practices	OEC	3	0	0	3	3
5.	CME365	Renewable Energy Technologies	OEC	3	0	0	3	3
6.	OME354	Applied Design Thinking	OEC	3	0	0	3	3
7.	MF3003	Reverse Engineering	OEC	3	0	0	3	3
8.	OPR351	Sustainable Manufacturing	OEC	3	0	0	3	3
9.	AU3791	Electric and Hybrid Vehicles	OEC	3	0	0	3	3
10.	OAS352	Space Engineering	OEC	3	0	0	3	3
11.	OIM351	Industrial Management	OEC	3	0	0	3	3
12.	OIE354	Quality Engineering	OEC	3	0	0	3	3
13.	OSF351	Fire Safety Engineering	OEC	3	0	0	3	3
14.	OML351	Introduction to non-destructive testing	OEC	3	0	0	3	3
15.	OMR351	Mechatronics	OEC	3	0	0	3	3
16.	ORA351	Foundation of Robotics	OEC	3	0	0	3	3
17.	OGI351	Remote Sensing Concepts	OEC	3	0	0	3	3
18.	OAI351	Urban Agriculture	OEC	3	0	0	3	3
19.	OEN351	Drinking Water Supply and Treatment	OEC	3	0	0	3	3
20.	OEE352	Electric Vehicle technology	OEC	3	0	0	3	3
21.	OEI353	Introduction to PLC Programming	OEC	3	0	0	3	3
22.	OCH351	Nano Technology	OEC	3	0	0	3	3
23.	OCH352	Functional Materials	OEC	3	0	0	3	3

24.	OFD352	Traditional Indian Foods	OEC	3	0	0	3	3
25.	OFD353	Introduction to Food Processing	OEC	3	0	0	3	3
26.	OPY352	IPR for Pharma Industry	OEC	3	0	0	3	3
27.	OTT351	Basics of Textile Finishing	OEC	3	0	0	3	3
28.	OTT352	Industrial Engineering for Garment Industry	OEC	3	0	0	3	3
29.	OTT353	Basics of Textile Manufacture	OEC	3	0	0	3	3
30.	OPE351	Introduction to Petroleum Refining and Petrochemicals	OEC	3	0	0	3	3
31.	OPE334	Energy Conservation and Management	OEC	3	0	0	3	3
32.	OPT351	Basics of Plastics Processing	OEC	3	0	0	3	3
33.	OEC351	Signals and Systems	OEC	3	0	0	3	3
34.	OEC352	Fundamentals of Electronic Devices and Circuits	OEC	3	0	0	3	3
35.	CBM348	Foundation Skills in integrated product Development	OEC	3	0	0	3	3
36.	CBM333	Assistive Technology	OEC	3	0	0	3	3
37.	OMA352	Operations Research	OEC	3	0	0	3	3
38.	OMA353	Algebra and Number Theory	OEC	3	0	0	3	3
39.	OMA354	Linear Algebra	OEC	3	0	0	3	3
40.	OBT352	Basics of Microbial Technology	OEC	3	0	0	3	3
41.	OBT353	Basics of Biomolecules	OEC	3	0	0	3	3
42.	OBT354	Fundamentals of Cell and Molecular Biology	OEC	3	0	0	3	3

OPEN ELECTIVES – IV

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OHS352	Project Report Writing	OEC	3	0	0	3	3
2.	OMA355	Advanced Numerical Methods	OEC	3	0	0	3	3
3.	OMA356	Random Processes	OEC	3	0	0	3	3
4.	OMA357	Queuing and Reliability Modelling	OEC	3	0	0	3	3
5.	OMG354	Production and Operations Management for Entrepreneurs	OEC	3	0	0	3	3
6.	OCE354	Basics of Integrated Water Resources Management	OEC	3	0	0	3	3
7.	OMG355	Multivariate Data Analysis	OEC	3	0	0	3	3
8.	OME352	Additive Manufacturing	OEC	3	0	0	3	3
9.	CME343	New Product Development	OEC	3	0	0	3	3
10.	OME355	Industrial Design & Rapid Prototyping Techniques	OEC	3	0	0	3	3
11.	MF3010	Micro and Precision Engineering	OEC	3	0	0	3	3
12.	OMF354	Cost Management of Engineering Projects	OEC	3	0	0	3	3
13.	OAS353	Space Vehicles	OEC	3	0	0	3	3
14.	AU3002	Batteries and Management system	OEC	3	0	0	3	3
15.	AU3008	Sensors and Actuators	OEC	3	0	0	3	3
16.	OIM352	Management Science	OEC	3	0	0	3	3
17.	OIM353	Production Planning and Control	OEC	3	0	0	3	3
18.	OIE353	Operations Management	OEC	3	0	0	3	3

COURSE OBJECTIVES:

- To learn the Types of low speed Wind tunnels and non-dimensional numbers with its applications.
- To learn the Types of high speed Wind tunnels and with its calibration methods.
- To Understand the Special Wind tunnels and with its calibration methods with its design methods.
- To describe flow visualization techniques and data acquisition methods.
- To understand the functions of various instruments associated with wind tunnel

UNIT I LOW SPEED WIND TUNNELS**9**

Classification –non-dimensional numbers-types of similarities - Layout of open circuit and closed circuit subsonic wind tunnels – design parameters-energy ratio - HP calculations - Calibration methods.

UNIT II HIGH SPEED WIND TUNNELS**9**

Blow down, in draft and induction tunnel layouts and their design features -Transonic, and supersonic tunnels- peculiar features of these tunnels and operational difficulties - sample design calculations and calibration methods.

UNIT III SPECIAL WIND TUNNEL TECHNIQUES**9**

Types of Special Wind Tunnels – Hypersonic, Gun and Shock Tunnels – Design features and calibration methods- Intake tests – store carriage and separation tests - wind tunnel model design for these tests

UNIT IV WIND TUNNEL INSTRUMENTATION**9**

Instrumentation and sensors required for both steady and unsteady measurements – Force measurements using three component and six component balances – calibration of measuring instruments – error estimation and uncertainty analysis.

UNIT V FLOW VISUALIZATION and NON-INTRUSIVE FLOW DIAGNOSTICS**9**

Smoke and Tuft grid techniques – Dye injection special techniques – Oil flow visualization and PSP techniques - Optical methods of flow visualization – PIV and Laser Doppler techniques – Image processing and data deduction

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

At the end of the course, students will be able to

- CO1: Explain the uses of various types of tunnels and its losses
- CO2: Experiment with calibration of different types of high speed tunnels
- CO3: Make use of various special tunnels and its applications
- CO4: Make use of various measurement techniques of instruments of wind tunnel
- CO5: Can use various techniques for aerodynamic data generation

TEXT BOOKS:

1. NAL-UNI Lecture Series 12:" Experimental Aerodynamics", NAL SP 98 01 April 1998
2. Rae, W.H. and Pope, A., "Low Speed Wind Tunnel Testing", John Wiley Publication, 1984.

REFERENCES:

1. Bradsaw "Experimental Fluid Mechanics".
2. Lecture course on Advanced Flow diagnostic techniques 17-19 September 2008 NAL, Bangalore
3. Pope, A., and Goin, L., "High Speed Wind Tunnel Testing", John Wiley, 1985.
4. Rathakrishnan, E., "Instrumentation, Measurements, and Experiments in Fluids," CRC Press – Taylor & Francis, 2007.
5. Short term course on Flow visualization techniques, NAL , 2009

MAPPING OF COS AND POS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	1	3	-	-	3	-	-	-	-	-	-	-	3	1	-
CO3	1	3	1	1	1	-	-	-	-	-	-	-	3	1	-
CO4	1	2	-	2	3	-	-	-	-	-	-	-	2	-	-
CO5	1	1	1	-	-	-	-	-	-	-	-	-	3	1	1
Avg	1	2.2	1	1.5	2.3	-	-	-	-	-	-	-	2.6	1	1

GE3791

HUMAN VALUES AND ETHICS

L T P C
2 0 0 2**COURSE DESCRIPTION**

This course aims to provide a broad understanding about the modern values and ethical principles that have evolved and are enshrined in the Constitution of India with regard to the democratic, secular and scientific aspects. The course is designed for undergraduate students so that they could study, understand and apply these values in their day to day life.

COURSE OBJECTIVES:

- To create awareness about values and ethics enshrined in the Constitution of India
- To sensitize students about the democratic values to be upheld in the modern society.
- To inculcate respect for all people irrespective of their religion or other affiliations.
- To instill the scientific temper in the students' minds and develop their critical thinking.
- To promote sense of responsibility and understanding of the duties of citizen.

UNIT I DEMOCRATIC VALUES

6

Understanding Democratic values: Equality, Liberty, Fraternity, Freedom, Justice, Pluralism, Tolerance, Respect for All, Freedom of Expression, Citizen Participation in Governance – World Democracies: French Revolution, American Independence, Indian Freedom Movement.

Reading Text: Excerpts from John Stuart Mills' *On Liberty*

UNIT II SECULAR VALUES

6

Understanding Secular values – Interpretation of secularism in Indian context - Disassociation of state from religion – Acceptance of all faiths – Encouraging non-discriminatory practices.

Reading Text: Excerpt from *Secularism in India: Concept and Practice* by Ram Puniyani

UNIT III SCIENTIFIC VALUES

6

Scientific thinking and method: Inductive and Deductive thinking, Proposing and testing Hypothesis, Validating facts using evidence based approach – Skepticism and Empiricism – Rationalism and Scientific Temper.

Reading Text: Excerpt from *The Scientific Temper* by Antony Michaelis R

UNIT IV SOCIAL ETHICS

6

Application of ethical reasoning to social problems – Gender bias and issues – Gender violence – Social discrimination – Constitutional protection and policies – Inclusive practices.

Reading Text: Excerpt from *21 Lessons for the 21st Century* by Yuval Noah Harari

UNIT V SCIENTIFIC ETHICS

6

Transparency and Fairness in scientific pursuits – Scientific inventions for the betterment of society - Unfair application of scientific inventions – Role and Responsibility of Scientist in the modern society.

Reading Text: Excerpt from *American Prometheus: The Triumph and Tragedy of J.Robert Oppenheimer* by Kai Bird and Martin J. Sherwin.

TOTAL: 30 PERIODS

COURSE OUTCOMES

Students will be able to

- CO1 : Identify the importance of democratic, secular and scientific values in harmonious functioning of social life
- CO2 : Practice democratic and scientific values in both their personal and professional life.
- CO3 : Find rational solutions to social problems.
- CO4 : Behave in an ethical manner in society
- CO5 : Practice critical thinking and the pursuit of truth.

REFERENCES:

1. The Nonreligious: Understanding Secular People and Societies, Luke W. Galen Oxford University Press, 2016.
2. Secularism: A Dictionary of Atheism, Bullivant, Stephen; Lee, Lois, Oxford University Press, 2016.
3. The Oxford Handbook of Secularism, John R. Shook, Oxford University Press, 2017.
4. The Civic Culture: Political Attitudes and Democracy in Five Nations by Gabriel A. Almond and Sidney Verba, Princeton University Press,
5. Research Methodology for Natural Sciences by Soumitro Banerjee, IISc Press, January 2022

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Anna University, Chennai-600 025

OBJECTIVES:

- To introduce the knowledge of the maintenance and repair procedures followed for overhaul of aero engines.
- To acquire knowledge in preparation of glass epoxy of composite laminates and its specimens
- To learn about Welding and sheet metal repair.

LIST OF EXPERIMENTS

1. Dismantling of an aircraft piston engine.
2. Assembling of an aircraft piston engine.
3. Study of Camshaft operation, firing order and magneto, valve timing
4. Study of lubrication and cooling system
5. Study of auxiliary systems, pumps and carburetor
6. Aircraft wood gluing-single & double scarf joints
7. Preparation of Single/Double Riveted Lap joint
8. Preparation of Single/Double Riveted butt joint
9. Sheet metal forming
10. Sheet metal - Riveted Patch Repair.
11. Dye penetrant test - NDT
12. Tube bending and flaring

TOTAL: 30 PERIODS

OUTCOMES:

- Take part in Dismantling and reassembling of an aircraft piston engine
- Inspect the Welding repair in various components of aircraft frames
- Take part in preparation of glass epoxy of composite laminates and its specimens

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	2	1	2	2	3	3	2	2	2	1	2
CO2	2	3	1	1	1	1	2	2	2	2	1	1	3	2	3
CO3	2	3	1	1	1	1	2	2	2	2	1	2	2	1	2
	2.67	3	1.33	1	1.33	1.0	2	2.00	2.33	2.33	1.33	1.67	2.33	1.33	2.33

OBJECTIVES:

- To train the students “ON HAND” experience in maintenance of various air frame systems in aircraft
- To train students in rectification of common snags.
- To train students on maintenance of control systems

LIST OF EXPERIMENTS

1. Aircraft “Jacking Up” procedure
2. Aircraft “Levelling” procedure
3. Control System “Rigging check” procedure
4. Aircraft “Symmetry Check” procedure
5. “Flow test” to assess of filter element clogging

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6. "Pressure Test" To assess hydraulic External/Internal Leakage
7. "Functional Test" to adjust operating pressure
8. "Pressure Test" procedure on fuel system components
9. "Brake Torque Load Test" on wheel brake units
10. Maintenance and rectification of snags in hydraulic and fuel systems.
11. Aircraft weighing procedure
12. Study of combinational control surfaces

TOTAL: 30 PERIODS

OUTCOMES:

- CO 1** Take part in maintenance of aircraft systems.
CO 2 Take part in inspections of aircraft components and systems.
CO 3 Examine various control surfaces of aircraft and their functions.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	1	1	2	3	3	2	2	3	2	3
CO2	3	2	1	-	-	-	-	2	2	2	1	1	2	1	1
CO3	3	3	2	1	1	1	-	2	3	3	2	2	2	2	2
	3.0	2.67	1.67	1	1.00	1.0	1.00	2.00	2.67	2.67	1.67	1.67	2.33	1.67	2



AE3781

COMPUTATIONAL ANALYSIS LABORATORY

L T P C
0 0 2 1

OBJECTIVES:

To familiarize with

- The stress distribution
- Meshing of various geometries
- Variation of mechanical properties on different load conditions,
- Flow analysis, and
- Thermal analysis.

LIST OF EXPERIMENTS:

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1. Grid independence study and convergence test using any simple case like cylinder
2. Simulation of flow over an aero foil
3. Simulation of flow over backward facing step.
4. Simulation of Karman vortex trail (vortex shedding) using circular cylinder.
5. External flow simulation of subsonic and supersonic aero foils.
6. Internal flow simulation of subsonic, sonic and supersonic flow through a CD nozzle.
7. Structural analysis of bar and beam
8. Structural analysis of truss.
9. Structural analysis of tapered wing.
10. Structural analysis of fuselage structure.
11. Analysis of composite laminate structures.
12. Heat transfer analysis of structures.

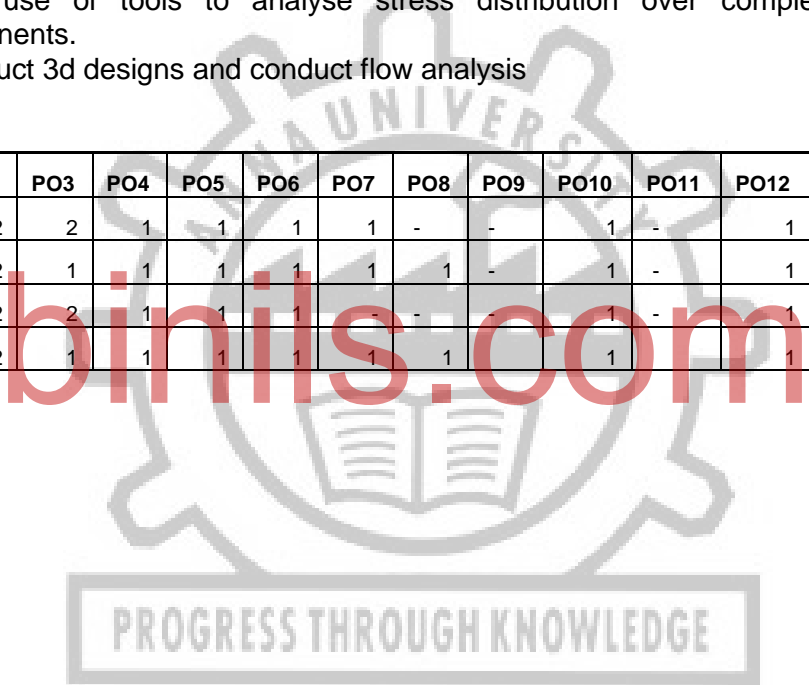
TOTAL: 30 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

- Develop and effectively employ solid modelling and simulation tools.
- Choose right specification and create a simple trade diagram.
- Choose appropriate structural models.
- Make use of tools to analyse stress distribution over complex structural components.
- Construct 3d designs and conduct flow analysis

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	1	1	1	-	-	1	-	1	2	1	2
CO2	2	2	1	1	1	1	1	1	-	1	-	1	2	2	1
CO3	2	2	2	1	1	1	-	-	-	1	-	1	2	2	2
	2	2	1	1	1	1	1	1	1	1	1	1	2	1.67	1.67



AE3811

PROJECT WORK / INTERNSHIP

L T P C
0 0 20 10

COURSE OBJECTIVES:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.
- The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor.
- The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required