SEMESTER V

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK L	T	P	TOTAL CONTACT PERIODS	CREDITS
THEORY								
1.	AE3501	Aircraft Structures-II	PCC	3	0	0	3	3
2.	AE3502	Aerodynamics II	PCC	3	0	0	3	3
3.		Professional Elective I	PEC	-	-	-	-	3
4.		Professional Elective II	PEC	-	-	-	-	3
5.		Professional Elective III	PEC	-	-	-	-	3
6.		Mandatory Course-I[&]	MC	3	0	0	3	0
PRACTICALS								
7.	AE3511	Aircraft Structures Laboratory	PCC	0	0	4	4	2
8.	AE3581	CAD Laboratory	PCC	0	0	4	4	2
			TOTAL	-	-	-	-	**19**

[&] Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under MC- I)

SEMESTER VI

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK L	T	P	TOTAL CONTACT PERIODS	CREDITS
THEORY								
1.	AE3691	Flight Dynamics	PCC	3	1	0	4	4
2.	AE3601	Aircraft Design	PCC	3	0	0	3	3
3.		Open Elective – I*	OEC	3	0	0	3	3
4.		Professional Elective IV	PEC	-	-	-	-	3
5.		Professional Elective V	PEC	-	-	-	-	3
6.		Professional Elective VI	PEC	-	-	-	-	3
7.		Mandatory Course-II[&]	MC	3	0	0	3	0
8.		NCC Credit Course Level 3[#]		3	0	0	3	3
PRACTICALS								
9.	AE3611	Aircraft Design Project	PCC	0	0	4	4	2
10.	AE3612	Flight Training / Flight Simulation Laboratory	PCC	0	0	4	4	2
			TOTAL	-	-	-	-	**23**

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

[&] Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under MC- II)

[#] NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA

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MANDATORY COURSES I

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	MX3081	Introduction to Women and Gender Studies	MC	3	0	0	3	0
2.	MX3082	Elements of Literature	MC	3	0	0	3	0
3.	MX3083	Film Appreciation	MC	3	0	0	3	0
4.	MX3084	Disaster Risk Reduction and Management	MC	3	0	0	3	0

MANDATORY COURSES II

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	MX3085	Well Being with Traditional Practices - Yoga, Ayurveda and Siddha	MC	3	0	0	3	0
2.	MX3086	History of Science and Technology in India	MC	3	0	0	3	0
3.	MX3087	Political and Economic Thought for a Humane Society	MC	3	0	0	3	0
4.	MX3088	State, Nation Building and Politics in India	MC	3	0	0	3	0
5.	MX3089	Industrial Safety	MC	3	0	0	3	0

ELECTIVE – MANAGEMENT COURSES

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	GE3751	Principles of Management	HSMC	3	0	0	3	3
2.	GE3752	Total Quality Management	HSMC	3	0	0	3	3
3.	GE3753	Engineering Economics and Financial Accounting	HSMC	3	0	0	3	3
4.	GE3754	Human Resource Management	HSMC	3	0	0	3	3
5.	GE3755	Knowledge Management	HSMC	3	0	0	3	3
6.	GE3792	Industrial Management	HSMC	3	0	0	3	3

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PROFESSIONAL ELECTIVE COURSES:VERTICALS

VERTICAL 1: COMPUTATIONAL ENGINEERING

SL. NO.	COURS ECODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CAE331	Numerical Methods in Fluid Dynamics	PEC	3	0	0	3	3
2.	CAE332	Computational Heat Transfer	PEC	3	0	0	3	3
3.	CAE333	Finite Element Methods	PEC	3	0	0	3	3
4.	CAE334	Computational Fluid Dynamics	PEC	3	0	0	3	3
5.	CAE335	Computer Aided Design and Analysis	PEC	3	0	0	3	3
6.	CAE336	Grid Generation Techniques	PEC	3	0	0	3	3

VERTICAL 2: AERODYNAMICS AND PROPULSION

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CAE337	Experimental Aerodynamics	PEC	3	0	0	3	3
2.	CAE338	High Speed Aerodynamics	PEC	3	0	0	3	3
3.	CAE339	Industrial Aerodynamics	PEC	3	0	0	3	3
4.	CAE340	Rocket Propulsion	PEC	3	0	0	3	3
5.	CAE341	Advanced Propulsion Systems	PEC	3	0	0	3	3
6.	CAE342	Hypersonic Aerodynamics	PEC	3	0	0	3	3

VERTICAL 3 : AEROSPACE STRUCTURES

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CAE343	Fatigue and Fracture Mechanics	PEC	3	0	0	3	3
2.	CAE344	Experimental Stress Analysis	PEC	3	0	0	3	3
3.	CAE345	Composite Materials and Structures	PEC	3	0	0	3	3
4.	CME339	Additive Manufacturing	PEC	2	0	2	4	3
5.	CMF338	Non Destructive Testing and Evaluation	PEC	3	0	0	3	3
6.	CAE346	Aerospace Materials	PEC	3	0	0	3	3

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AE3501 **AIRCRAFT STRUCTURES - II** **L T P C 3 0 0 3**

COURSE OBJECTIVES:

01. To familiarise the student, the generalized theory of pure bending and work out problems in the calculation of bending stress involving different methods.
02. To gain knowledge in the concept of shear flow in thin-walled sections.
03. To carry out shear flow analysis involving different types of sections.
04. To Impart theoretical knowledge on the behaviour of thin plates and thin-walled columns.
05. To carry out basic stress analysis procedures involving aircraft structural components.

UNIT I UNSYMMETRICAL BENDING OF BEAMS 9

Unsymmetrical bending of beams – different methods of analysis (neutral axis method, 'k' method, and the principal axis method), stresses and deflections in beams under unsymmetricalbending.

UNIT II SHEAR FLOW IN OPEN SECTIONS 9

Definition and expression for shear flow due to bending, shear flow in thin-walled Open sections with and without stiffening elements, torsion of thin-walled Open sections, the shear center of symmetric and unsymmetrical open sections, structural idealization.

UNIT III SHEAR FLOW IN CLOSED SECTIONS 9

Shear flow due to bending and torsion in single-cell and multi-cell structures, the shear center of symmetric and unsymmetrical closed sections, effect of structural idealization, shear flow in a tapered beam, stress analysis of thin-webbed beams using Wagner's theory.

UNIT IV BUCKLING OF PLATES 9

Behaviour of a rectangular plate under compression, governing equation for plate buckling, buckling analysis of sheets and stiffened panel under compression, concept of the effective sheet width, buckling due to shear and combined loading, crippling.

UNIT V AIRCRAFT STRESS ANALYSIS 9

Loading and analysis of aircraft wing, fuselage, and tail unit. Use of V-n diagram for sizing the aircraft wing, fuselage, and tail unit.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, Students will be able to

CO1: Analyse and investigate the normal stress variation on unsymmetrical sections subjected to bending moments.

CO2: Determine the shear flow variation in thin walled open sections with skin effective andineffective in bending. Also to find out the shear centre of sections.

CO3: Calculate the shear flow variation in single cell and multicell tubes subjected to shearand torque loads

CO4: Investigate the behaviour of buckling of simply supported plates and also to know theeffective width of sheet stringers combination.

CO5: Analyse the shear and bending moment variation of aircraft wing and fuselage and also to know the characteristics of thin webbed beams.

TEXT BOOKS:

1. Bruhn. E.H., 'Analysis and Design of Flight Vehicles Structures', Tri-state off-setcompany, USA, 1985.
2. Howard D Curtis, 'Fundamentals of Aircraft Structural Analysis', WCB-McGraw Hill,1997.
3. Megson T M G, 'Aircraft Structures for Engineering Students', Butterworth-Heinemann;5th edition, 2012.

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REFERENCES:

1. Peery, D.J., and Azar, J.J., Aircraft Structures, 2nd edition, McGraw – Hill, N.Y., 1999.
2. Rivello, R.M., Theory and Analysis of Flight Structures, McGraw Hill, 1993.

MAPPING COS AND POS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2.5	2	-	1	-	-	-	-	3	3	1	1
CO2	3	3	2	2.5	2	-	1	-	-	-	1	3	3	1	1
CO3	3	3	2	2.5	2	1	1	-	-	-	1	3	3	1	1
CO4	3	2.5	2	2.5	2	-	1	-	-	-	1	3	3	1	1
CO5	3	3	2.5	3	2.5	1	1	-	-	-	1	3	3	1	1
Avg.	3	2.9	2.1	2.6	2.1	0.4	1	-	-	-	0.8	3	3	1	1

AE3502 **AERODYNAMICS II** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To introduce the concepts of compressibility,
- To learn the theory behind the formation of shocks and expansion fans in Supersonic flows.
- To introduce the methodology of measurements in Supersonic flows.
- To get knowledge on high speed flow over air foils, wings and airplane configuration.
- To learn the concepts of Transonic flow

UNIT I ONE DIMENSIONAL COMPRESSIBLE FLOW 9

Energy, Momentum, continuity and state equations, velocity of sound, adiabatic steady state flow equations, Flow through convergent- divergent passage, Performance under various back pressures.

UNIT II NORMAL AND OBLIQUE SHOCKS 9

Prandtl equation and Rankine – Hugonoit relation, Normal shock equations, Pitot static tube, corrections for subsonic and supersonic flows, Oblique shocks and corresponding equations, Hodograph and pressure turning angle, shock polar, flow past wedges and concave corners, strong, weak and detached shocks

UNIT III EXPANSION WAVES AND METHOD OF CHARACTERISTICS 9

Flow past convex corners, Expansion hodograph, Reflection and interaction of shocks and expansion, waves. Method of Characteristics Two dimensional supersonic nozzle contours. Rayleigh and Fanno Flows.

UNIT IV DIFFERENTIAL EQUATIONS OF MOTION FOR STEADY COMPRESSIBLE FLOWS 9

Small perturbation potential theory, solutions for supersonic flows, Mach waves and Mach angles, Prandtl-Glauert rule - affine transformation relations for subsonic flows, linearized two dimensional supersonic flow theory - Lift, drag, pitching moment and center of pressure of supersonic profiles.

UNIT V TRANSONIC FLOW OVER WING 9

Lower and upper critical Mach numbers, Lift and drag, divergence, shock induced separation, Characteristics of swept wings, Effects of thickness, camber and aspect ratio of wings, Transonic area rule.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, Students will be able to

CO1: Calculate the compressible flow through a duct of varying cross section.
CO2: Use quasi one-dimensional theory to analyse compressible flow problems.
CO3: Estimate fluid properties in Rayleigh and Fanno type flows.
CO4: Estimate the properties across normal and oblique shock waves.
CO5: Understand the knowledge of various techniques and methods for solving differential equations of motion for steady compressible flows.
CO6: Predict the properties of transonic flows.

TEXT BOOKS:

1. Anderson Jr., D., – “Modern compressible flows”, McGraw-Hill Book Co., New York, 1999.
2. L.J. Clancy, “Aerodynamics” Sterling Book House, 2006

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REFERENCES

1. Rathakrishnan, E., “Gas Dynamics”, 6th Edition, Prentice Hall of India, 2017.
2. Shapiro, A.H., “Dynamics and Thermodynamics of Compressible Fluid Flow”, Ronald Press, 1982.

MAPPING OF COS AND POS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	3	3	-	-	-	-	-	-	-	3	1	1
CO2	2	3	3	3	3	-	-	-	-	-	-	-	3	1	1
CO3	2	3	3	3	3	-	-	-	-	-	-	-	3	1	1
CO4	2	3	3	3	3	-	-	-	-	-	-	-	3	1	1
CO5	2	2	2	2	2	-	-	-	-	-	-	-	3	1	1
Avg	2	2.8	2.8	2.8	2.8	-	-	-	-	-	-	-	3	1	1

AE3511 AIRCRAFT STRUCTURES LABORATORY

	L	T	P	C
	0	0	4	2

COURSE OBJECTIVES:

- To enable the students understand the behavior of aircraft structural components under different loading conditions.
- To provide the Principle involved in photo elasticity and its applications in stress analysis for composite laminates.
- To obtain the stresses in circular discs and beams using photo elastic techniques

LIST OF EXPERIMENTS

1. Deflection of Beams
2. Verification of superposition theorem
3. Verification of Maxwell's reciprocal theorem
4. Buckling load estimation of slender eccentric columns
5. Determination of flexural rigidity of composite beams
6. Unsymmetrical Bending of a Cantilever Beam
7. Combined bending and Torsion of a Hollow Circular Tube
8. Material Fringe Constant of a Photo elastic Models
9. Shear Centre of a Channel Section
10. Free Vibration of a Cantilever Beam
11. Forced Vibration of a cantilever Beam
12. Fabrication of a Composite Laminate.
13. Determination of Elastic constants for a Composite Tensile Specimen.
14. Determination of Elastic constants for a Composite Flexural Specimen.
15. Tension field beam

Any 10 experiments can be chosen

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Evaluate the effects of bending in the aircraft structures.
CO2: Explain the shear centre of the aircraft structures.
CO3: Compare the photo-elastic techniques on the aircraft structures.
CO4: Justify the experimental findings in clear oral and concise report.

MAPPING COS AND POS:

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

AE3581 **CAD LABORATORY**

L	T	P	C
0	0	4	2

OBJECTIVES:

- To make the students familiarize with computational fluid dynamics and structural analysis software tools.
- To learn the concepts involved in designing a product
- To understand the importance of specification paraments while designing

LIST OF EXPERIMENTS

1. Computer aided design of subsonic diffusers.
2. Computer aided design of supersonic diffusers
3. Computer aided design of a compressor blade.
4. Computer aided design of convergent nozzle
5. Computer aided design of a Converging-diverging nozzle.
6. Computer aided design of typical aircraft wing.
7. Computer aided design of typical fuselage structure.
8. Computer aided design of a landing gear.
9. Computer aided design of a launch vehicles.
10. Computer aided design of a re-entry vehicles.
11. Computer aided design of a Missiles.
12. Computer aided design of a Satellites

TOTAL: 60 PERIODS

OUTCOMES:

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

- Compare commercial design software and understand its structure.
- Deduct the aircraft and spacecraft components and solve engineering problems.
- Explain a formal technical report and convey engineering specifications.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	-		-	-	-	-	-	-	2	1	1
CO2	2	2	2	-	-	-	-	-	-	-	-	-	2	1	1
CO3	3	3	3	1	-	-	1	1	-	1	-	1	2	-	-
	2.3	2.3	2.3	1	1	1	1	1.00		1		1	2	1	1

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