

AEROSPACE VEHICLE STRUCTURES LAB

V Semester:

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
A5AE22	PCC	-	-	3	1.5	30	70	100

COURSE OBJECTIVES

The purpose of this subject is to provide the students with the theoretical background and engineering applications.

1. Install strain gauges correctly on a structure and apply appropriate electronics to measure strain with the gauges.
2. Experimentally determine the load-displacement behaviour of common aerospace thin-walled structures
3. Identify design features of aerospace structures, and calculate load factors and margins of safety;
4. Analyze the behaviour of thin-walled beams subjected to combined loads, including bending, torsion, and shear;
5. Analyze the stability of structural elements and determine critical buckling loads

LIST OF EXPERIMENTS

1. Fabrication & Testing of riveted joints.
2. Verification of Maxwell's and Castiglianos theorems
3. Determination of critical load for a column – (i) Both ends hinged; (ii) Both ends fixed.
4. Determination of critical load for a column – One end fixed other end hinged.
5. NDT inspection – Dye penetration, Magnetic particle and Ultrasonic testing
6. Shear centre of an open section beam
7. Shear centre of a closed section beam
8. Shear centre of an unsymmetrical section
9. Determination of natural frequency
 - i) Beam undergoing free longitudinal vibrations
 - ii) Shaft undergoing torsional vibrations
10. Determination of natural frequency for a beam – Forced vibration

Text Books:

1. Megson T. H. G (2012), Aircraft Structures for Engineering Students, 5th edition, Elsevier, New York.
2. 3E F Bruhn (1973), Analysis and Design of Flight Vehicle Structures, Tri-state Offset Company, USA

Reference Books:

1. B. C. Punmia (2011), Theory of Structures, 13th edition, Laxmi Publication, Hyderabad
2. Timoshenko, Mechanics of Materials, CBS Publication

EQUIPMENT NEEDED:

1. UTM – 20 / 40 Tons.
2. Shear center Test rig
3. NDT Equipment
 - a. Ultrasonic apparatus
 - b. Magnetic Particle test rig
 - c. Dye penetration test
4. Vibration test rig.
5. Deflection test rig

6. Column test rig

COURSE OUTCOMES

At the end of the course the students are able to:

1. Classify types of shear loads acting on beam
2. Estimate crippling load acting on short and long column.
3. Determine surface flaws as well as internal flaws using ndt techniques
4. Analyze the various strain pressure using thin walled pressure vessel
5. Determine the failures on riveted plates using utm