INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad – 500043

Aeronautical Engineering

List of Laboratory Experiments

AEROSPACE STRUCTURES LABORATORY								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AAEC11	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		0	0	3	1.5	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 36**				**Total Classes: 36**		
Branch: AE	**Semester: IV**	**Academic Year: 2021-22**				**Regulation: UG20**		

Course overview: Aircraft structural laboratory overviews the fundamentals of beams, loads and deflections. Also, it discusses the various testing methods for defining the characteristics of materials used for aerospace structures. Further, it encourages the students to undertake the projects in the area of structural analysis of thin walled structural components, wings, fuselage and landing gears.

Course objectives:

The students will try to learn:

I. The provide basic knowledge on the mechanical behaviour of materials like aluminium, mild steel, and cast iron.
II. The visualize the crack detection using various NDT methods and also discuss the changing strength due to these defects.
III. The understand the concept of locating the shear center for open and closed section of beams.
IV. The obtain buckling strength of both long and short columns using different elastic supports.

Course outcomes:

After successful completion of the course, students will be able to:

CO 1 **Examine** the deflection of beams, Maxwell's reciprocal theorem and Stress-Strain curve for various materials for obtaining the minimum stress.

CO 2 **Compare** the buckling strength for short and long columns with various end conditions and verify it with Euler's formula for designing of beams used in aerospace structures.

CO 3 **Assess** the deflection of beams in out of plane and the location of shear center for beam for designing with minimum stresses and location of loading point.

CO 4 **Utilize** the Wagner theorem for determining the buckling stresses and the young's modulus of a sandwich structure for designing of beams.

CO 5 **Utilize** Non-Destructive Technique for minimizing failures under static and dynamic loading conditions.

CO 6 **Apply** the natural frequencies of beams under free and force vibration for avoiding failure due to resonance

WEEK NO	EXPERIMENT NAME	Course Outcomes
WEEK – I	**DEFLECTION TEST**	CO1
	Verification of Maxwell's reciprocal theorem on Simply supported beam	
WEEK – II	**BUCKLING TEST**	CO2
	To determine the Crippling load on short and long columns by using Euler's column theory	
WEEK – III	**COMPRESSION TEST**	CO3
	To determine the compressive strength of given specimen	
WEEK – IV	**BENDING TEST**	CO3
	To determine the deflection on un symmetrical beam with different loading conditions.	
WEEK – V	**SHEAR CENTER FOR OPEN SECTION**	CO3
	To determine the shear center for open section beam	
WEEK – VI	**SHEAR CENTER FOR CLOSED SECTION**	CO3
	To determine the shear center for closed section beam.	
WEEK – VII	**SHEAR STRESS FOR RIVETED JOINTS**	CO3
	To determine the shear strength of a lap joint	
WEEK –VIII	**SANDWICH PANEL TENSION TEST**	CO4
	To determine the Tensile strength of given composite specimen	

WEEK - IX	**NON-DESTRUCTIVE TESTING-I**	**CO5**
	To observe the cracks on a given specimen by using die penetration techniques	
WEEK - X	**NON-DESTRUCTIVE TESTING-II**	**CO5**
	To observe the cracks on a given specimen by using Magnetic particle inspection method	
WEEK - XI	**NON-DESTRUCTIVE TESTING-III**	**CO5**
	To observe the cracks on a given specimen by ultrasonic inspection method	
WEEK - XII	**VIBRATION TEST**	**CO6**
	To determine the frequency of a cantilever beam under different excitations.	