AEROSPACE STRUCTURES LABORATORY

IV Semester: AE									
Course Code	Category	Hours / Week			Credits	Maximum Marks			
AAE104	Core	L	Т	Р	С	CIA	SEE	Total	
		-	-	3	2	30	70	100	
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 48				Total Classes: 48			

OBJECTIVES:

The course should enable the students to:

- I. Provide basic knowledge on the mechanical behavior of materials like aluminum, mild steel, and cast iron.
- II. Visualize the crack detection using various NDT methods and also discuss the changing strength due to these defects.
- III. Understand the concept of locating the shear centre for open and closed section of beams
- IV. Obtain buckling strength of both long and short columns using different elastic supports.

COURSE LEARNING OUTCOMES (CLOs):

The students should enable to:

- 1. Understand the various engineering materials property subjected to tensile loadsUtilize basic
- 2. Understand the stress strain curves of various engineering materials subjected to tensile loads
- 3. Understand the Stress and deflections of beams subjected to transverse loads for various end conditions
- 4. Understand the Stress and deflections of beams subjected to transverse loads for various end conditions
- 5. verification of Maxwell's reciprocal theorem by using Beam test rig
- 6. Understanding the critical buckling loads of long columns subjected to Compression loads
- 7. Understanding the critical buckling loads of short columns subjected to Compression loads
- 8. Verification of south well plot columns subjected to loads,
- 9. Understanding the Unsymmetrical Bending behavior of a Beam.
- 10. Understanding the Shear Centre behavior of an open Section beam
- 11. Understanding the Shear Centre behavior of an closed Section beam
- 12. Understanding the Wagner beam concept for Tension field beam
- 13. Understanding Fabrication and determine the young's modulus of a sandwich structures
- 14. The Study of non-destructive testing procedures using dye penetration
- 15. Understanding the Magnetic particle inspection and ultrasonic techniques.

16. Determination of natural frequency of beams under free and forced vibration using.

LIST OF EXPERIMENTS

Week-1 DIRECT TENSION TEST

Tensile testing using UTM, mechanical and optical extensometers, stress strain curves and strength test or various engineering materials.

Week-2 DEFLECTION TEST

Stress and deflections of beams for various end conditions, verification of Maxwell's theorem

Week-3 BUCKLING TEST

Compression tests on long columns, Critical buckling loads.

Week-4	BUCKLING TEST				
Compression tests on short columns, Critical buckling loads, south well plot					
Week-5	BENDING TEST				
Unsymmetrical Bending of a Beam.					
Week-6	SHEAR CENTRE FOR OPEN SECTION				
Shear Centre of an open Section beam.					
Week-7	SHEAR CENTRE FOR CLOSED SECTION				
Shear Centre of a closed Section beam					
Week-8	WAGNER'S THEOREM				
Wagner beam – Tension field beam					
Week-9	SANDWICH PANEL TENSION TEST				
Fabrication and determine the young's modulus of a sandwich structures					
Week-10	NON-DESTRUCTIVE TESTING				
Study of not	Study of non-destructive testing procedures using dye penetration				
WeeK-11	NON-DESTRUCTIVE TESTING				
Magnetic particle inspection and ultrasonic techniques					
Week-12	VIBRATION TEST				
Determination of natural frequency of beams under free and forced vibration using					
 Text Books: 1 R. K Bansal, —Strength of Materials^{II}, Laxmi publications, 5th Edition, 2012. 2 T. H. G. Megson, —Aircraft Structures for Engineering Students^{II}, Butterworth-Heinemann Ltd, 5th Edition, 2012 3 Gere, Timoshenko, —Mechanics of Materials^{II}, McGraw Hill 3rd Edition, 1993 					
Reference Books:					
 Dym, C. L, Shames, I. H, —Solid Mechanics, McGraw Hill, Kogakusha, Tokyo, 7th Edition, 2007. Stephen Timoshenko, —Strength of Materials, Vol I & II, CBS Publishers and Distributors, 3rd Edition, 2004. 					
3. R. K. Ra 4. Timoshe Princetor	 K. K. Kajput, —Strength of Materials, S. Chand and Co., 1st Edition, 1999. Timoshenko, S, Young, D. H. —Elements of Strength of Materials, T. Van Nostrand Co. Inc., Princeton N.J, 4th Edition, 1977. 				