COURSE CONTENT

AEROSPACE STRUCTURES LABORATORY								
IV Semester: AE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AAED11	Core	L	T	P	C	CIA	SEE	Total
		-	-	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
Prerequisite: Aircraft Structures								

I. COURSE OVERVIEW:

Aircraft structural laboratory is used to enhance the learning of the undergraduate student by encouraging them to undertake the projects in the area of structural analysis of thin-walled structural components, wings, fuselage and landing gears.

II. COURSE OBJECTIVES:

The students will try to learn:

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.

III. COURSE OUTCOMES:

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

CO1 Make use of various calibration techniques for assessing the flow quality in wind tunnel test section.

CO2 Examine the pressure distribution over airfoil, cylinder and flat plate for predicting their aerodynamics characteristics.

CO3 Utilize the six-component force balancer for deducing the forces and moments of aircraft model and hence obtaining the aircraft performance and stability.

CO4 Determine the pressure, temperature across each component gas turbine engine for predicting its thrust and performance characteristics.

CO5 Examine the performance characteristics of compressor, blower, propeller and nozzle for their efficient design

CO6 Identify the flash point, fire point and calorific value of different fuels for their suitability in aerospace applications.

IV. COURSE CONTENT

Week-1: DEFLECTION TEST

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

Week-2: BUCKLING TEST
Compression tests on long columns, Critical buckling loads.

Week-3: COMPRESSION TEST
Compression tests on short columns, Critical buckling loads, south well plot

Week-4: BENDING TEST
Unsymmetrical Bending of a Beam

Week-5: SHEAR CENTRE FOR OPEN SECTION
Shear Centre of an open Section beam.

Week-6: SHEAR CENTRE FOR CLOSED SECTION
Shear Centre of a closed Section beam.

Week- 7: SHEAR STRESS OF RIVETED JOINTS
Shear strength of riveted joints using UTM

Week -8: SANDWICH PANEL TENSION TEST
Fabrication and determine the young's modulus of a sandwich structures.

Week-9: NON-DESTRUCTIVE TESTING-I
Study of non-destructive testing procedures using dye penetration.

Week- 10: NON-DESTRUCTIVE TESTING-II
Non-destructive testing procedures - Magnetic particle inspection.

Week- 11: NON-DESTRUCTIVE TESTING-III
Non-destructive testing procedure - Ultrasonic techniques.

Week-12: VIBRATION TEST
Determination of natural frequency of beams under free and forced vibration using.

Week-13: AIRCRAFT WINGS
Study about the Aircraft Wings

Week-14: AIRFRAMES
Investigation of aircraft parts like fuselages, cockpit, engine, propeller

V. TEXT BOOKS:

1. T. H. G. Megson, "Aircraft Structures for Engineering Students", Butterworth-Heinemann Ltd, 5th Edition, 2012
2. E. H. Bruhn, "Analysis and Design of Flight vehicles Structures", Tri-state off set company, USA, 4th Edition, 1965.

VI. REFERENCE BOOKS:

1. B. K. Donaldson, "Analysis of Aircraft Structures - An Introduction", McGraw Hill, 3rd Edition, 1993.

VII. ELECTRONICS RESOURCES:

1. https://nptel.ac.in/courses/112101095/
2. https://www.scribd.com/doc/244154727/theory-of-structures-timoshenko-pdf

VIII. MATERIALS ONLINE

1. Course template
2. Lab manual