

SEMESTER 5**AIRCRAFT STRUCTURES LAB**

Course Code	PCAOL 508	CIE Marks	50
Teaching Hours/Week (L: T:P: R)	0:0:3:0	ESE Marks	50
Credits	2	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Practical

Course objectives:

- 1 Apply theoretical knowledge to effectively provide practical knowledge on static and dynamic analysis of aircraft structural components under different loading conditions.
To impart practical knowledge of flow through different parts of a gas turbine engine.

Experiment No.	Experiment
1	Constant Strength Beams
2	Buckling of Columns
3	Unsymmetrical Bending of Beams
4	Flexibility Matrix for Cantilever Beam
5	Combined Loading
6	Wagner Beam
7	Shear Centre Location for Open Section
8	Shear Centre Location for Closed Section
9	Vibration Damping Test- Longitudinal
10	Vibration Damping Test- Torsional
11	Stress-Strain measurement on Pressurized thin-walled tubes of various materials using strain gauges
12	Stress-Strain measurement on flat plate and cylindrical rod with axial loads using strain gauges

13	Stress-Strain measurement on hollow cylindrical rod with torsional load using strain gauges
14	Stress-Strain measurement using strain rosette – Star and Delta connected
15	Verification of stress optic law using photoelasticity.

Course Assessment Method

Course Assessment Method (CIE: -50 Marks, ESE: 50 Marks)

Continuous Internal Evaluation Marks (CIE):

<i>Attendance</i>	<i>Preparation/Pre-Lab Work, experiments, Viva and Timely completion of Lab Reports / Record (Continuous Assessment)</i>	<i>Internal Exam</i>	<i>Total</i>	<i>Attendance</i>
10	20	20	50	10

End Semester Examination Marks (ESE)

Procedure/ Preparatory work/Design/ Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/ Quality of Output	Viva voce	Record	Total
10	15	10	10	5	50

- ***Submission of Record:*** Students shall be allowed for the end semester examination only upon submitting the duly certified record.
- ***Endorsement by External Examiner:*** The external examiner shall endorse the record.

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Evaluate the buckling and bending strength of different structural members.	K4
CO2	Analyse the shear centre position for open and closed section of beams	K4
CO3	Evaluate the natural frequency for longitudinal and torsional vibration of different structural components.	K4
CO4	Evaluate the stress-strain values for different structural components	K4

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1				1	2	1		1
CO2	3	2	2	1				1	2	1		1
CO3	3	2	2	1				1	2	1		1
CO4	3	2	2	1				1	2	1		1

Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Aircraft Structures for Engineering students	Megson T M G	Elsevier	2007
2	Mechanics of Materials	Timoshenko and Gere	Tata McGraw Hill	1993
3	Mechanical Vibrations	Grover. G.K	Nem Chand Brothers, Roorkee,	2003
4	Experimental Stress Analysis	Sadhu Singh	Khanna Publishers, New Delhi,	2009

Continuous Assessment (20 Marks)

1. Preparation and Pre-Lab Work (5 Marks)

- Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
- Understanding of Theory: Evaluation based on students' preparation and understanding of the theoretical background related to the experiments.

2. Conduct of Experiments (5 Marks)

- Procedure and Execution: Adherence to correct procedures, accurate execution of experiments, and following safety protocols.
- Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.
- Teamwork: Collaboration and participation in group experiments.

3. Lab Reports and Record Keeping (5 Marks)

- Quality of Reports: Clarity, completeness and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.
- Timely Submission: Adhering to deadlines for submitting lab reports/rough record and maintaining a well-organized fair record.

4. Viva Voce (5 Marks)

- Oral Examination: Ability to explain the experiment, results and underlying principles during a viva voce session.

***Final Marks Averaging:** The final marks for preparation, conduct of experiments, viva, and record are the average of all the specified experiments in the syllabus.*

Evaluation Pattern for End Semester Examination (50 Marks)

1. Procedure/Preliminary Work/Design/Algorithm (10 Marks)

- Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.
- Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment.
- Algorithm Development: Correctness and efficiency of the algorithm related to the experiment.
- Creativity and logic in algorithm or experimental design.

2. Conduct of Experiment/Execution of Work/Programming (15 Marks)

- Setup and Execution: Proper setup and accurate execution of the experiment or programming task.

3. Result with Valid Inference/Quality of Output (10 Marks)

- Accuracy of Results: Precision and correctness of the obtained results.

- Analysis and Interpretation: Validity of inferences drawn from the experiment or quality of program output.

4. Viva Voce (10 Marks)

- Ability to explain the experiment, procedure results and answer related questions
- Proficiency in answering questions related to theoretical and practical aspects of the subject.

5. Record (5 Marks)

Completeness, clarity, and accuracy of the lab record submitted