

SEMESTER 5**PROPULSION LAB**

Course Code	PCAOL 507	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)	Engineering Thermodynamics, Fluid Mechanics	Course Type	Practical

Course objectives:

- 1 To explore practically components of aircraft piston and gas turbine engines and their working principles.
2. To impart practical knowledge of flow through different parts of a gas turbine engine.

Experiment No.	Experiment
1.	Study of aircraft piston and its components.
2.	Study of gas turbine engines and its components.
3.	Port timing of a 2-stroke engine.
4.	Valve timing of a 4 – stroke engine
5.	Determination of Propeller Thrust and Performance
6.	Performance test on a 4-stroke engine
7.	Wall pressure measurements of subsonic diffusers.
8.	Determine Velocity profiles of wall jets.
9.	Wall pressure measurements of supersonic diffusers.
10.	Cascade testing of axial compressor blade row.
11.	Flame stabilization studies using conical and hemispherical flame holders.

12.	Cascade testing of axial Turbine blade row.
13.	Determine the velocity profiles of free jets.
14.	Wall Pressure measurements of nozzle.
15.	Determination of calorific value of a fuel.

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	Understand the practical working of components of piston and gas turbine engines employed for airplane propulsion.	K2
CO2	Analyse the performance of Inlets diffusers, Combustion Chamber and Nozzle	K4
CO3	Calculate the performance of piston engines.	K3
CO4	Analyse the flow through compressor and turbine cascades.	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	1	1	-	-	-	-	1	2	1	-	3
CO2	3	3	2	2	-	-	-	1	2	1	-	1
CO3	3	3	1	2	-	-	-	1	2	1	-	1
CO4	3	3	2	2	-	-	-	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	Gas Turbine Theory	H Cohen. G F C Rogers HIH Saravanamuthoo	Pearson	2008

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Elements of Propulsion: Gas Turbines and Rockets	Jack D. Mattingly	AIAA Education Series, 3rd Edition,	2006

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.