

SEMESTER 3

FLUID MECHANICS LAB

Course Code	PCAOL307	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. To familiarise the applications of Fluid mechanics and dynamics.
2. Perform experiments to illustrate the viscous flow in open and closed channel.
3. To gain practical experience in handling flow measuring devices.

Details of Experiment

Expt. No	Experiment
1	Study of pipe fittings, valves, gauges, tools, and instruments.
2	Determination of coefficient of discharge and calibration of Venturimeter.
3	Determination of coefficient of discharge and calibration of Orifice meter.
4	Determination of coefficient of discharge and calibration of V-notch.
5	Determination of coefficient of discharge and calibration of Rectangular notch.
6	Determination of coefficient of discharge of Mouthpiece using constant head and varying head method.
7	Determine Chezy's constant and Darcy's coefficient of pipe friction.
8	Determination of Hydraulic Coefficients of orifices.
9	Determination of Minor losses in various pipe fittings.
10	Determine the metacentric height of a floating body.
11	Impact of jet on flat and curved surface.
12	Verification of Bernoulli's theorem.
13	Determination of velocity profile using Pitot-static tube.
14	Measurement of Fluid Viscosity.
15	Reynolds experiment.
16	Measurement of drag on a circular cylinder in high Reynolds number flow.

Note: A minimum of 10 experiments are mandatory.

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

Continuous Internal Evaluation Marks (CIE):

Attendance	Preparation/Pre-Lab Work, experiments, Viva and Timely completion of Lab Reports / Record. (Continuous Assessment)	Internal Exam	Total
5	25	20	50

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

Mandatory requirements for ESE:

- 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 the student will be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Calibrate flow measuring devices such as Venturimeter, orifice meter and notches.	K3
CO2	Compute hydraulic coefficients associated with pipe flow.	K3
CO3	Compute the losses in pipes due to friction.	K3
CO4	Compute velocity profiles for any given fluid flow.	K3
CO5	Calculate the metacentric height for stability of the floating body.	K3

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

CO-PO Mapping Table

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2				2	2	1	1	-
CO2	3	3	1	2				2	2	1	1	-
CO3	3	3	1	2				2	2	1	1	-
CO4	3	3	1	2				2	2	1	1	-
CO5	3	3	1	2				2	2	1	1	-

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	Fluid Mechanics: An Introduction	E Rathakrishnan	Prentice Hall	3 rd Edition, 2012
2	Fluid Mechanics: Fundamentals and Applications	John. M. Cimbala and Yunus A. Cengel,	McGraw Hill	3 rd Edition, 2019

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Fluid Mechanics- Fundamentals and Applications	Yunus A. Cengel, John M. Cimbala	McGraw Hill,	2019
2	Engineering Fluid Mechanics	Graebel. W. P	Taylor & Francis, Indian Reprint,	2011
3	Fluid Mechanics and Machinery	Robert W. Fox, Alan T. McDonald, Philip J. Pritchard,	John Wiley and sons.	2015

Video Links (NPTEL, SWAYAM...)	
Sl. No.	Link ID
1	https://archive.nptel.ac.in/courses/112/106/112106311/

Continuous Assessment (25 Marks)

1. Preparation and Pre-Lab Work (7 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 (7 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 (6 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