

25UCEL306	FLUID MECHANICS LAB	Category	L	T	P	R	Credit	Year of Introduction
		PCC	0	0	3	02		2025

Preamble: This laboratory course complements the theoretical Mechanics of Fluids course by providing practical exposure to fluid flow behaviour, measurement techniques, hydraulic devices, and energy relationships. The course develops essential experimental skills, data interpretation abilities, and technical documentation practices through hands on experimentation.

Prerequisite: Nil

CO	Course Outcomes	Knowledge Level
CO1	Perform calibration and measurement experiments using standard fluid flow instruments and devices.	K3 Apply
CO2	Determine flow parameters and hydraulic coefficients through experimental verification of fundamental fluid mechanics principles.	K3 Apply
CO3	Examine fluid flow behaviour in pipes and open channels through controlled laboratory experiments.	K4 Analyse
CO4	Analyse the performance characteristics of pumps and turbines .	K4 Analyse

Course Outcomes: After the completion of the course, the student will be able to:

Mapping of course outcomes with program outcomes and program specific outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	-	3	3	-	-	2	-	-	-	3	2	-
CO2	3	3	-	3	2	-	-	2	-	-	-	3	2	1
CO3	2	1	-	3	1	-	-	2	-	-	-	2	3	-
CO4	3	3	-	2	2	-	-	2	-	-	-	3	2	1
Avg	2.5	2.25	-	2.75	2	-	-	2	-	-	-	3	2.25	1

Mapping of course outcomes with Knowledge and Attitude Profile (WK)

	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
CO1	*	*	*	*		*		*	
CO2	*	*	*	*		*		*	
CO3	*	*	*	*		*		*	
CO4	*	*	*	*		*		*	

Wks Mapped with the course

WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
*	*	*	*		*		*	

Mark Distribution:

Total Marks	CIE Marks	ESE Marks	ESE Duration
100	50	50	3 hrs

Continuous Internal Evaluation Marks (CIE):

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

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 trouble-shooting 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.

End Semester Examination Marks (ESE):

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

Submission of Record: Students shall be allowed to attend the end semester examination only upon submitting the duly certified record. The external examiner shall endorse the record

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

SYLLABUS

Exp. No.	Experiments
1	Study of taps, valves, pipe fittings, gauges, Pitot tubes, water meters, and current meters

2	Calibration of pressure gauges
3	Determination of meta centric height and radius of gyration of floating bodies
4	Verification of Bernoulli's theorem
5	Determination of hydraulic coefficients of orifices and mouthpieces under constant head and time of emptying methods
6	Calibration of Venturi meter
7	Calibration of Orifice meter
8	Calibration of water meter
9	Calibration of rectangular notch
10	Calibration of triangular notch
11	Determination of coefficient of discharge using time of emptying method
12	Plotting of Specific Energy Curves in open channel flow
13	Study of hydraulic jump characteristics in open channel flow
14	Determination of friction coefficient in pipes
15	Determination of loss coefficients for pipe fittings
16	Performance test on turbines (impulse / reaction turbines)
17	Performance test on pumps (positive displacement and rotodynamic pumps)

Note: A minimum of **12 experiments** shall be completed.

Text Books:

1. P. N. Modi & S. M. Seth(2019). *Hydraulics and Fluid Mechanics including Hydraulic Machines*. 22nd Edition. Rajsons Publications. Standard Book House.
2. R. K. Bansal (2023). *Fluid Mechanics and Hydraulic Machines*. 11th Edition. Laxmi, Publications.
3. K. Subramanya(2019). *Flow in Open Channels*. 5th Edition. Mc Graw Hill Publishers.

Reference Books:

1. Arora.K.R(2005). *Fluid Mechanics, Hydraulics and Hydraulic Machines*. Standard Publishers.
2. Victor Streeter, E. Benjamin Wylie, K.W. Bedford (2017). *Fluid Mechanics*. Mc Graw Hill Publishers.
3. Bruce R. Munson, Donald F. Young, Theodore H. Okiishi(2005). *Fundamentals of Fluid*

Mechanics. 9th Edition. John Wiley & Sons Inc.