R. N. G. PATEL INSTITUTE OF TECHNOLOGY-RNGPIT
(An Autonomous Institute U/s UGC Act 1956)

B.Tech. SEMESTER-III, SEMESTER END EXAMINATION – WINTER 2025

SUBJECT CODE: 1CV305   **DATE: 26-12-2025**
SUBJECT NAME: FLUID MECHANICS
TIME: 11:00 AM to 01:30 PM   **TOTAL MARKS: 70**

Instructions
1. It is **compulsory** for students to write **Enrolment No. /Seat No.** on the question paper.
2. Write answers of **Section A** and **Section B** in **separate answer books**.
3. Attempt all questions from both **Section A** and **Section B**.
4. Each section carries **35 marks**, with a total of **70 marks** for the examination.
5. The figures to the right of each question indicate full marks, make suitable assumptions with justification.
6. BL - Cognitive Level (As per Revised Bloom's Taxonomy) (R-Remember, U-Understanding, A –Application, N –Analyze, E – Evaluate, C -Create), CO - Course Outcomes.

SECTION A

			Marks	BL	CO
Q.1	**(a)**	Enlist and explain various loss of energy in pipes.	03	U	5
	(b)	Derive Darcy-Weisbach formula for the loss of head due to friction in a pipe.	04	N	5
Q.2	**(a)**	Write a short note on Venturimeter.	03	U	4
	(b)	Give the advantages of the Triangular notch over rectangular notch.	04	U	4
	(c)	Derive Euler's Equation of motion.	07	N	4

OR

			Marks	BL	CO
Q.2	**(a)**	Write a short note on pitot- tube.	03	U	4
	(b)	Give the classification of orifices.	04	U	4
	(c)	Write a short note on notches and weirs. Also give the difference between notches and weirs.	07	U	4
Q.3	**(a)**	Give the difference between pipe flow and open channel flow.	03	U	6
	(b)	Write a short note on Specific Energy. Explain Specific energy curve in detail.	04	U	6
	(c)	Derive the equation for the most economical section for Trapezoidal channel section.	07	N	6

OR

			Marks	BL	CO
Q.3	**(a)**	What is undistorted and distorted model? What are the advantages of using distorted model?	03	U	6
	(b)	Explain Buckingham π-theorem.	04	U	6
	(c)	Find the width and depth of a rectangular channel to convey a discharge of 1.5 m³/s at a velocity of 0.5 m/s. Take chezys constant equal to 60 and the bed slope equal to 0.00012.	07	A	6

SECTION B

			Marks	BL	CO
Q.4	**(a)**	Explain vapour pressure and describe its significance in fluid flow applications.	03	U	1
	(b)	Explain capillarity and give two practical examples where it is observed in fluid systems.	04	U	1
Q.5	**(a)**	Explain the concept of stability of submerged bodies.	03	U	2
	(b)	Explain the theoretical method of determining the metacentric height of a floating body.	04	A	2
	(c)	Derive the expression for total hydrostatic force and center of pressure on a vertically submerged surface with a neat sketch.	07	E	2

OR

			Marks	BL	CO
Q.5	**(a)**	Differentiate between absolute pressure, gauge pressure, and vacuum pressure with one example each.	03	U	2
	(b)	Explain how a U-tube manometer can be used to measure differential pressure with an example.	04	A	2
	(c)	Describe in detail the experimental method of determining metacentric height of a floating body and discuss how shifting weights affects stability.	07	E	2
Q.6	**(a)**	Define streamline, path line, and streak line with simple sketches.	03	U	3
	(b)	Explain the Reynolds experiment and analyze how transitions from laminar to turbulent flow.	04	A	3
	(c)	Explain the concepts of circulation and vorticity. Derive the expression for vorticity in two-dimensional flow and discuss its physical meaning.	07	E	3

OR

			Marks	BL	CO
Q.6	**(a)**	Distinguish between rotational and irrotational flow.	03	U	3
	(b)	Discuss the conditions for subcritical, critical, and supercritical flow and state how they affect flow behavior in channels.	04	A	3
	(c)	Explain the relationship between velocity potential and stream function, and show how they satisfy the Laplace equation for irrotational flow.	07	E	3

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