



Term Evaluation (Even) Semester Examination March 2025

Roll no.

Name of the Course: B.Tech **(ME)**

Semester: 4th

Name of the Paper: *FLUID MECHANICS AND FLUID MACHINES*

Paper Code: TME-407

Time: 1.5 hour

Maximum Marks: 50

Note:

- (i) Answer all the questions by choosing any one of the sub-questions
- (ii) Each question carries 10 marks.

Q1. (10 Marks)

- a. Differentiate between Newtonian and non-Newtonian fluids with suitable examples. How does rheological classification help in understanding fluid behavior? **CO1**

OR

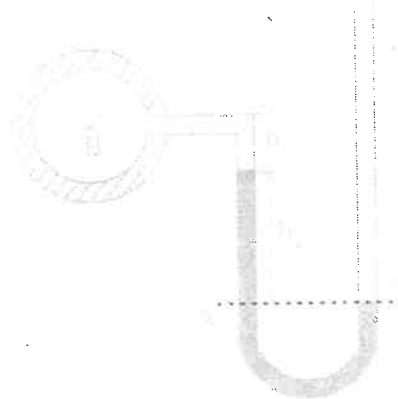
- b. Define surface tension and capillarity. Derive an expression for the capillary rise in a tube of radius r . **CO3**

Q2. (10 Marks)

- a. Derive the pressure-density-height relationship in a static fluid and explain its significance in manometer measurements. **CO2**

OR

- b. Find Pressure at point B for the given figure, Given ρ_1 = density of light liquid, ρ_2 = density of dark liquid. **CO6**



Q3. (10 Marks)

- a. Define buoyancy and derive the condition for the stability of a floating body. How does metacentric height determine stability? **CO1**

OR

- b. A two-dimensional velocity field is given by $u = 3x + 2y$, $v = -2x + 4y$. Determine if the flow is irrotational and find the stream function. **CO4**

Q4. (10 Marks)

- a. Differentiate between rotational and irrotational flows with examples. How do we determine whether a flow is rotational or irrotational using velocity components? **CO2**



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OR

- b. Define and differentiate between streamlines, pathlines, and streaklines. How do these concepts help in visualizing fluid flow? **CO2**

Q5.

(10 Marks)

- a. Derive Euler's equation of motion for an ideal fluid and explain its significance in fluid mechanics. Also Derive Bernoulli's equation from Euler's equation. Discuss its assumptions and limitations. **CO2**

OR

- b. Explain the working of a Pitot tube. How is it used to measure fluid velocity? Derive an expression for velocity measurement. Also Explain vortex motion and classify it into free and forced vortices. Derive the equation of motion for a free vortex flow. **CO4**