



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

InSem Examination-I Winter 2023		
Exam Seat No.:		
Academic Year:2023-2024	Semester:III	
Name of Programme:B.Tech Mechanical Engineering	Pattern:2022	
Name of Course:Fluid Mechanics	Course Code:MEC222002	
Max. Marks:30	Duration:1 Hr	

<p>Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.</p> <ol style="list-style-type: none">1. This question paper contains 3pages.2. Answer to each new question is to be started on a new page.3. Assume suitable data wherever required, but justify it.4. Draw the neat labelled diagrams, wherever necessary.5. The last columns indicates the Course Outcome of the Question/sub-question	
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Question No. 1 Attempt following Question

- a) What is viscosity? State and explain Newton's law of viscosity. (5) CO1

OR

- b) Explain i) Surface tension ii) Capillarity iii) Specific Gravity (5) CO1
- c) Define Buoyancy, Centre of buoyancy? Apply the buoyancy principle to block floating on the water to get the different floating conditions. (5) CO1

OR

- d) What is manometer? How they are classified. (5) CO2

- e) A 10 mm glass tube is inserted into trough containing mercury. Find the capillarity effect when the contact angle is i) 180° (5) CO1
ii) 110°

OR

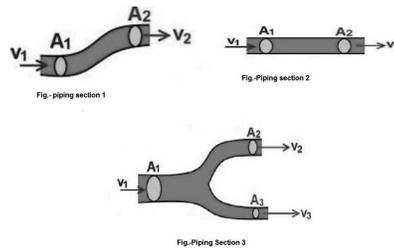
- f) A shaft of 150 mm diameter moves in a sleeve of length 300 mm at a speed of 0.5 m/s under the application of 200 N force in the direction of its motion. If the clearance between shaft and sleeves is 0.08 mm, Calculate viscosity of the lubricating oil in the gap. (5) CO1

Question No. 2 Attempt following Question

- a) Discuss various types of flows with examples. (5) CO2

OR

- b) Explain the continuity equation in 1-D form. Apply the continuity equation to the following piping sections



(5) CO2

- c) Define and Explain Velocity potential function? (5) CO3

OR

- d) What are the types of flow lines? (5) CO3

- e) If the velocity components are given by

$$u = 8 + 4xy + t^2, v = -(xy + 20t), w = 5x + y \quad (5) \quad \text{CO3}$$

What is the velocity and the acceleration of a particle at (2,1,1) at $t = 1$

OR

f)

The velocity potential function is given by an expression

$$\phi = -\frac{xy^3}{3} - x^2 + \frac{x^3y}{3} + y^2$$

(5) CO3

1. Find the velocity components in x and y direction.
2. Show that ϕ represents the possible case of flow.