



P.E.S. College of Engineering, Mandya - 571 401
 (An Autonomous Institution affiliated to VTU, Belagavi)
Third Semester, B.E. - Civil Engineering
Semester End Examination; Dec. - 2019
Fluid Mechanics

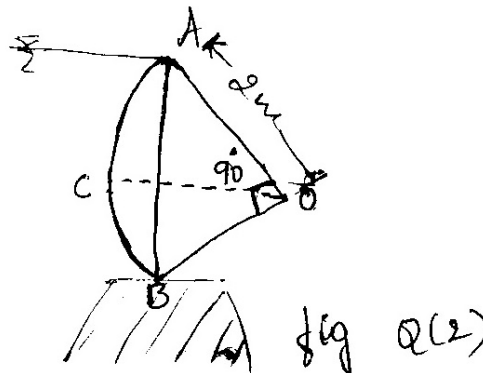
Time: 3 hrs

Max. Marks: 100

Note: i) **PART - A** is compulsory. **Two** marks for each question.

ii) **PART - B:** Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks
I : PART - A		10
I a.	Define surface tension and dynamic viscosity.	2
b.	Write two differences between Ideal fluid and Real fluid.	2
c.	Define Pressure and Pressure head.	2
d.	Distinguish between Uniform and Non-uniform flow.	2
e.	Define total pressure and center of pressure.	2
II : PART - B		90
UNIT - I		18
1 a.	Define Relative density, Kinematic viscosity and derive unit for Kinematic viscosity.	9
b.	Specific gravity of a liquid is 0.7, find; i) Mass density ii) Specific weight also find the mass and weight of 10 liters of liquid.	9
c.	A plate having an area of 1 m ² is dragged down on inclined plane which is inclined at 45° to horizontal with a velocity of 0.5 ms ⁻¹ due to its own weight. There is a cushion of liquid of 1 mm thick between the inclined plane and the plates, if viscosity of oil is 0.1 N-s/m ² , find the weight of the plate.	9
UNIT - II		18
2 a.	State and prove Pascal's law.	9
b.	Find the horizontal and vertical component of force and its point of application due to water / meter width of the gate AB having a quadrant shape of radius 2 m shown in Fig. Q(2). Find also the resultant force in Magnitude and Direction.	9



- c. Show that the center of pressure in case of vertical plane immersed in a static mass of fluid lies below the centroid of the plane surface 9

UNIT - III **18**

- 3 a. Show that the stream lines equipotential lines meet orthogonally. Define; i) Stream function ii) Velocity potential function. 9
- b. A Venturimeter of inlet dia 300 mm and throat dia 150 mm is inserted in vertical pipe carrying water flowing in the upward direction. A differential mercury manometer connected to the inlet and throat gives a reading of 200 mm. Find the discharge, if the coefficient of discharge of meter is 0.98. 9
- c. In a two dimensional incompressible flow the fluid velocity components are given by $U = X - 4Y$ and $V = -Y - 4X$. When U and V are X and Y components of velocity of flow, show that the flow satisfies the continuity equation and obtain stream function. 9

UNIT - IV **18**

- 4 a. List out the losses that occur in a pipe flow. Give the equation for quantifying them. 9
- b. i) Explain water hammer in pipes. 9
ii) Derive an expression for sudden contraction of pipe.
- c. A pipe line of length 2000 m is used for power transmission. If 110.3625 kW power is to be transmitted through the pipe in which water having a pressure of 490.5 N/cm^2 at inlet is flowing. Find the diameter of the pipe and efficiency of transmission, if the pressure drop over the length of pipe is 98.1 N/cm^2 . Take; $f = 0.0065$. 9

UNIT - V **18**

- 5 a. Define hydraulic coefficients. 9
- b. Derive the equation for discharge through a triangular notch. 9
- c. i) Make a note on Borda's mouth piece. 4
ii) Make a note on Cipolletti notch. 5

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