P P SAVANI UNIVERSITY

Third Semester of B. Tech. Examination

Nov-Dec 2021

SEME2060 Fluid Mechanics

14.12.2021, Tuesday **Time: 09:00 a.m. To 11:30 a.m.** **Maximum Marks: 60**

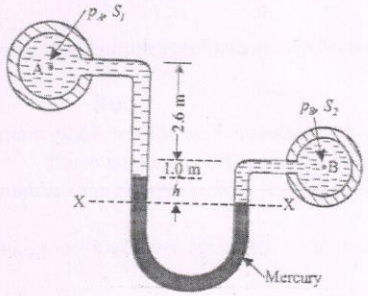
Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1 (i) Answer the Following: (MCQ/Short Question/Fill in the Blanks) **[03]**
Define any three properties of Fluid.

Q - 2 (a) Fig shows a U-tube differential manometer connecting two pressure pipes at A and B. The pipe A contains a liquid of specific gravity 1.4 under a pressure of 90 kN/m2. The pipe B contains oil of specific gravity 0.95 under a pressure of 150 kN/m2. Find the difference of pressure measured by mercury as fluid filling U-tube. **[05]**



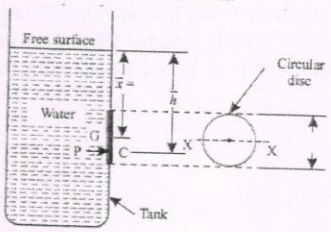
Q - 2 (b) Enlist various mechanical gauge and explain anyone. **[05]**
OR

Q - 2 (a) Explain Experimental Method of determining Metacentric height. **[05]**

Q - 2 (b) Write down various Stability condition for Floating body with neat sketch. **[05]**

Q - 3 (a) Derive the Equation for determining Centre of pressure in vertically immersed body. **[05]**

Q - 3 (b) A circular opening, 3 m diameter, in a vertical side of tank is closed by a disc of 3m diameter which can rotate about a horizontal diameter. Determine: **[05]**
(i) The force on the disc;
(ii) The torque required to maintain the disc in equilibrium in vertical position when the head of water above horizontal diameter is 4 m.



OR

Q - 3 (a)	Explain Types of flow.	[05]
Q - 3 (b)	Velocity for a two dimensional flow field is given by $V = (3 + 2xy + 4t^2)\, i + (xy^2 + 3t)\, j$ Find the velocity and acceleration at a point (3,2) after 4 sec.	[05]
Q - 4	A pipe (1) 550 mm in diameter branches into two pipes (2 and 3) of diameters 300 mm and 200 mm respectively. If the average velocity in 550 mm diameter pipe is 4 m/s find: (i) Discharge through 550 mm diameter pipe; (ii) Velocity in 200 mm diameter pipe if the average velocity in 300 mm pipe is 3.5 m/s.	[05]

SECTION - II

Q - 1	Answer the Following: (MCQ/Short Question/Fill in the Blanks)	[05]
(i)	Define Momentum correction factor.	
(ii)	What is weir? How it is different from a notch.	
(iii)	What is Cipolleti weir?	
(iv)	What is magnus effect?	
(v)	What is drag and lift?	
(vi)	What is Mouth piece?	
(vii)	What is Darcy-Weisbach formula for heat loss due to friction?	
Q - 2 (a)	What pitot tube? How the velocity at any point is determined with the help of pitot tube?	[05]
Q - 2 (b)	Derive an expression for the discharge through venturimeter with a neat sketch.	[05]

OR

Q - 2 (a)	State the momentum equation. How will you apply momentum equation for determining the force exerted by a flowing fluid on a pipe bend?	[05]
Q - 2 (b)	Define velocity of approach. How it is taken in to account while computing the discharge over weirs.	[05]
Q - 3 (a)	Derive the expression for discharge over the Rectangular notch.	[05]
Q - 3 (b)	Derive the expression for time required to empty a tank of cross sectional area A with a rectangular notch.	[05]

OR

Q - 3 (a)	Water flows over a rectangular weir 1m wide at a depth of 150 mm and afterward passes through a triangular right angled weir. Taking C_d for the rectangular and triangular weir as 0.62 and 0.59 respectively. Find the depth over the triangular weir.	[05]
Q - 3 (b)	Drive an expression to find out the ratio of area of outlet and throat for a convergent – divergent mouth piece.	[05]
Q - 4	Attempt any one/two.	[05]
(i)	Explain the various methods to find hydraulic coefficients for an orifice.	
(ii)	Prove that the addition of a short external tube of the same diameter to a circular orifice increase its discharge about 40%. Take C = 0.62 and C_v = 0.98.	