P P SAVANI UNIVERSITY

Third Semester of B. Tech. Examination

November 2022

SEME2060 Fluid Mechanics

03.12.2022, Saturday **Time: 10:00 a.m. To 12:30 p.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	MCQ/Short Question/Fill in the Blanks Define : Specific gravity, compressibility and Vapour pressure	**[03]**	**1**	**1**
Q - 2 (a)	Describe and Prove pascal's law.	**[04]**	**2**	**2**
Q - 2 (b)	An isosceles triangle of base 4 metres and altitude 8 metres is immersed vertically in water, with its axis of symmetry horizontal. If the head of water on it is 10 metres, determine: (i) Total pressure on the plate, and (ii) The position of the centre of pressure.	**[05]**	**2**	**4**
Q - 3 (a)	Write down the stability condition for the submerged and floating body.	**[04]**	**3**	**2**
Q - 3 (b)	A wooden block of specific gravity 0.9 and having a size of 3 m × 0.5m ×0.5 m is floating in water. Determine the volume of concrete of specific weight 25 kN/m3, that may be placed which will immerse (i) the block completely in water, and (ii) the block and concrete completely in water.	**[05]**	**3**	**4**
Q – 4 (a)	Enlist and explain types of flow.	**[04]**	**4**	**1**
Q – 4 (b)	A pipe (1) 650 mm in diameter branches into two pipes (2 and 3) of diameters 300 mm and 200 mm respectively. If the average velocity in 650 mm diameter pipe is 2 m/s find: (i) Discharge through 650 mm diameter pipe; (ii) Velocity in 200 mm diameter pipe if the average velocity in 300 mm pipe is 1.5 m/s.	**[05]**	**6**	**4**

SECTION – II

Q - 1	Answer the Following: (MCQ/Short Question/Fill in the Blanks)	**[05]**	**5**	**1**
(i)	Define orifice.			
(ii)	What is a vena contract?			
(iii)	What is a Hydraulic gradient line?			
(iv)	What is a convergent cone?			
(v)	What are mouthpieces?			
(vi)	Write down the various applications of the Pitot tube.			
(vii)	What is the co-efficient of Velocity?			
Q - 2 (a)	Derive Darcy Weisbach formula for the loss of head due to friction in the pipeline	**[05]**	**6**	**2**
Q - 2 (b)	Derive an expression for the head loss due to sudden pipe enlargement.	**[05]**	**6**	**2**
	OR			
Q - 2 (a)	Explain hydraulically smooth and rough pipes	**[05]**	**6**	**1**
Q - 2 (b)	What is Couette flow? Derive an expression of velocity and shear stress for Couette flow	**[05]**		**1**
Q - 3 (a)	What are the advantages of a triangular notch over a rectangular notch?	**[05]**	**5**	**2**
Q - 3 (b)	Derive the equation for determining the discharge from Borda's mouthpiece running full.	**[05]**	**5**	**1**

OR

Q - 3 (a)	Enlist the major and minor losses in pipes. Derive the expression for loss of head due to sudden contraction.	**[05]**	**6**	**2**
Q - 3 (b)	Derive the equation for discharge over a rectangular weir/Triangular weir.	**[05]**	**5**	**2**
Q - 4	Attempt any one/two.	**[05]**	**5**	**4**
(i)	Derive an expression for the loss of head due to sudden enlargement of a pipe			
(ii)	Oil of specific gravity 0.85 issues from a 5 cm diameter orifice under a pressure of 117.72 kN/m^2 (gauge). The diameter of the jet at the vena contracta is 4 cm and the discharge is 1.2 m^3/minute. What is the coefficient of velocity?			

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CO : Course Outcome Number BTL : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create