

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-IV (NEW) EXAMINATION – SUMMER 2021****Subject Code:3140611****Date:08/09/2021****Subject Name:Fluid Mechanics & Hydraulics****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		<b>MARKS</b>	
<b>Q.1</b>	(a) Define fluid, Specific gravity, Mass density	<b>03</b>	
	(b) Define viscosity and differentiate between kinematic and dynamic viscosity its ap	<b>04</b>	
	(c) Define surface tension. Prove the relationship between surface tension and inside a droplet of liquid in excess of outside pressure is given by $p = 4\sigma/d$ .	<b>07</b>	
<b>Q.2</b>	(a) Describe the terms atmospheric , absolute, gage and vaccum pressure with sketch	<b>03</b>	
	(b) Classify various manometers	<b>04</b>	
	(c) State Pascal's law and give some examples where this principle is applied	<b>07</b>	
<b>OR</b>			
<b>Q.3</b>	(c) Explain hydrostatic paradox with suitable demonstration	<b>07</b>	
	(a) Classify fluid flows.	<b>03</b>	
	(b) The velocity potential function is given by $\phi = 5(x^2 - y^2)$ . Calculate the velocity components at the point (4, 5)	<b>04</b>	
<b>Q.3</b>	(c) Explain flow net & Reynolds experiment.	<b>07</b>	
	<b>OR</b>		
	(a) Explain the term 'Total Pressure and Centre of Pressure'.	<b>03</b>	
<b>Q.4</b>	(b) Derive Euler's equation of motion along a stream line.	<b>04</b>	
	(c) A horizontal pipe carrying water of 20 cm diameter converges to 10cm diameter. If the pressures at two sections are 450 KN/m <sup>2</sup> and 150 KN/m <sup>2</sup> respectively. Compute the rate of flow of water.	<b>07</b>	
	(a) Discuss stability of submerged and floating bodies with neat sketches	<b>03</b>	
<b>Q.4</b>	(b) Explain the different hydraulic & mouth piece.	<b>04</b>	
	(c) Derive the expression for discharge over the (1) Rectangular notch and (2) Triangular notch	<b>07</b>	
	<b>OR</b>		
<b>Q.4</b>	(a) Explain the phenomenon of water hammer	<b>03</b>	
	(b) What is pitot-tube? How the velocity at any point is determined with the help of pitot-tube.	<b>04</b>	
	(c) What is venturimeter. Derive an expression for the discharge Through a venturimeter.	<b>07</b>	
<b>Q.5</b>	(a) Define continuity equation & derive it.	<b>03</b>	
	(b) What are repeating variables? How are they selected for dimensional analysis?	<b>04</b>	
	(c) Derive an expression for the loss of head due to friction in pipes.	<b>07</b>	
<b>OR</b>			
<b>Q.5</b>	(a) Explain viscous flow.	<b>03</b>	
	(b) Explain the terms. specific energy, critical depth, critical velocity, alternate depth	<b>04</b>	
	(c) State Buckingham's $\pi$ theorem. Why it is considered superior over Rayleigh method for dimension analysis.	<b>07</b>	

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