

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020****Subject Code:3152003****Date:03/02/2021****Subject Name:Fluid Mechanics & Machines****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Explain the following terms: Specific Density, Viscosity, Surface tension.	03
	(b) State & Prove Pascal's Law.	04
	(c) What is Meta-Center? Derive equation for Meta-Centric height of floating body.	07
Q.2	(a) Give differences between following (i) Kinematic viscosity and Dynamic Viscosity. (ii) Cohesion and Adhesion	03
	(b) Define The Capillary Effect & Derive The Equation for Capillary rise & Fall with sketch	04
	(c) What is Continuity Equation? Derive Continuity Equation for three dimensions.	07
Q.3	(a) What do you understand by laminar flow and turbulent flow?	03
	(b) Obtain the equation to the stream lines for the velocity field given as: $V = 2x^3 i - 6x^2 y j$	04
	(c) Derive expressions for total force and centre of pressure on a vertical plane surface submerged in static liquid.	07
Q.4	(a) Explain Archimedes principle.	03
	(b) Describe the types of fluid flow. Explain Stream-lines and Path-lines.	04
	(c) State and derive Bernoulli's theorem, state its application and assumptions made.	07
Q.5	(a) Explain boundary layer theory.	03
	(b) What is priming of centrifugal pump? Explain clearly why priming is essential before starting a centrifugal pump	04
	(c) Derive Darcy – Weisbach equation for the loss of head due to friction in pipes	07
Q.6	(a) What is Draft-Tube? Give types of Draft-Tubes.	03
	(b) Explain function of components of Pelton turbine.	04
	(c) A Pelton wheel is to be designed for a head of 60 m when running at 200 r.p.m. The pelton wheel develops 95.6475 kW shaft power. The velocity of the buckets=0.45 times the velocity of the jet, overall efficiency=0.85 and co-efficient of the velocity is equal to 0.98.	07
Q.7	(a) What is compressibility? Derive an expression for it?	03
	(b) Compare the centrifugal pumps with reciprocating pumps.	04
	(c) A centrifugal pump is to discharge $0.118 \text{ m}^3/\text{s}$ at a speed of 1450 r.p.m against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75%.determine the vane angle at the outer periphery of the impeller.	07

- Q.8**
- (a) Differentiate clearly between Impulse turbine and Reaction turbine. **03**
 - (b) Write short note on air vessel. **04**
 - (c) Define Specific speed of a centrifugal pump & derive the expression for the same. **07**

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