Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 152003 **Date: 01/05/2017**

Subject Name: Fluid Mechanics & Machines

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..**

Q.1	**(a)**	Two horizontal flat plates are placed 0.15 mm apart and the space between them is filled with an oil of viscosity 1 poise. The upper plate of area 1.5 m^2 is required to move with a speed of 0.5 m/s relative to the lower plate. Determine the necessary force and power required to maintain this speed.	**07**
	(b)	Enlist types of manometers. Differentiate between u-tube manometer and u-tube differential manometer.	**07**
Q.2	**(a)**	Answer the following. (i) State Pascal's law and hydrostatic law. (ii) Prove that the center of pressure for any immersed surface always lies below its centroid.	 **03** **04**
	(b)	Define and distinguish between following fluid properties (i) Dynamic Viscosity and Kinematic viscosity (ii) Cohesion and Adhesion (iii) Surface tension and Capillarity	**07**
		OR	
	(b)	A rectangular plate 3 m × 5 m is immersed vertically in water such that the 3 m side is parallel to the water surface. Determine the hydrostatic force and the center of pressure if the top edge of the surface is 1. Flush with the water surface. 2. 2 m below the water surface. Comment on the result.	**07**
Q.3	**(a)**	State Bernoulli's theorem. Derive an expression for the discharge through a venturimeter.	**07**
	(b)	Give differences between following flows (i) Steady and Unsteady flow. (ii)Uniform and non-uniform flow (iii) Laminar and Turbulent flow.	**07**
		OR	
Q.3	**(a)**	Derive Darcy-Weisbach equation for the loss of head due to friction in pipes.	**07**
	(b)	Answer the following. (i) Define stream function and velocity potential function. (ii) Derive Euler's equation of motion along a stream line for an ideal fluid and integrate it to get the Bernoulli's equation.	 **03** **04**
Q.4	**(a)**	Answer the following (i) Distinguish between forced vortex and free vortex flow. (ii) Define continuity equation and derive an expression for a three dimensional flow.	 **03** **04**
	(b)	State function of draft tube and explain with neat sketch different types of draft tubes.	**07**
		OR	

Q.4	**(a)**	Explain following terms: Net positive suction head, Priming, Cavitation in pump	**07**
	(b)	Compare Reciprocating pump and Centrifugal pump with figure.	**07**
Q.5	**(a)**	Sketch a hydro-power plant and explain its different elements.	**07**
	(b)	Two liter of petrol weighs 14 N. Calculate the specific weight, mass density, specific volume and specific gravity of petrol with respect to water.	**07**

OR

Q.5	**(a)**	Discuss the various characteristic curves of a centrifugal pump.	**07**
	(b)	What is a fluid? How are fluids classified?	**07**

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