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

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC- SEMESTER–III - EXAMINATION – SUMMER 2017

Subject Code: X31901 **Date:25/05/2017**

Subject Name: Fluid Mechanics

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)**	Derive Bernoulli's equation of motion. List all the assumptions made.	**07**
	(b)	State and prove Pascal's law with usual notations.	**07**
Q.2	**(a)**	Derive continuity equation in Cartesian coordinates for three dimensional flow.	**07**
	(b)	Define capillary effect and obtain the expression for capillary rise.	**07**
		OR	
	(b)	Explain the terms Cavitation and Vapor pressure in fluid flow.	**07**
Q.3	**(a)**	Give classification of fluid flow.	**07**
	(b)	A circular plate 1 m diameter is immersed in a liquid of specific gravity 0.9 with its plane making an angle of 30^0 with horizontal. The centre of the plate is at a depth of 2 m below the free surface. Determine: (i) Total pressure force on one side of the plate (ii) Location of centre of pressure.	**07**
		OR	
Q.3	**(a)**	A wooden block of specific gravity 0.8 floats in water. The size of block is 1m x 0.4m x 0.3m. Calculate meta centric height of it.	**07**
	(b)	Explain stability of floating bodies.	**07**
Q.4	**(a)**	Obtain Darcy-Weisbach formula for head loss due to friction.	**07**
	(b)	Explain the different types of similarities which must exist between model and prototype.	**07**
		OR	
Q.4	**(a)**	Derive an expression for Hagen - Poiseuille's formula for viscous flow through circular pipe.	**07**
	(b)	An oil of specific gravity 0.9 and viscosity 0.08 poise is flowing through a pipe of diameter 300 mm at the rate of 120 liters/s. Find the head lost due to friction for a 500 m length of pipe. Also find the power required to maintain the flow. Take $f = 0.079/(R_e)^{1/4}$	**07**
Q.5	**(a)**	Explain pressure wave propagation and show that sound velocity $C = \sqrt{(dp/d\rho)}$	**07**
	(b)	The resistance R to the motion of completely submerged body depends on length of body, velocity of flow, mass density and kinematic viscosity. Find the relation between R and other variables using suitable method.	**07**
		OR	
Q.5	**(a)**	A horizontal venturimeter of throat diameter 100 mm is placed to measure flow rate of 200 mm diameter pipe through which oil of specific gravity 0.85 is flowing. If discharge is measured 100 litres/sec and Cd = 0.97 for venturimeter find the difference of mercury level in two limbs of manometer.	**07**
	(b)	Describe Reynold's experiment and explain laminar and turbulent flow.	**07**

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