Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III(OLD) • EXAMINATION – WINTER 2016

Subject Code:130602 **Date:04/01/2017**

Subject Name:Fluid Mechanics

Time:10:30 AM to 01:00 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)**	Explain term dynamic viscosity and kinematic viscosity. Discuss effect of temperature on viscosity.	**07**
	(b)	State and prove Pascal's law.	**07**
Q.2	**(a)**	Derive an expression for total pressure and position of pressure when vertical surface immersed inside the liquid.	**07**
	(b)	A single U-tube manometer is used to measure water pressure in pipe line. The left limb of manometer is connected to the pipe and the right lime is open to atmosphere. The mercury level in the left limb is 80 mm below the center of the pipe and the right limb is 220mm above the center of the pipe. Calculate the pressure of water in meter and also in $KN/m^{2.}$	**07**
		OR	
	(b)	A body with a gravity force of 500 N with a flat surface area 0.2 m^2 slides down a lubricated inclined plane making a 30^0 angle with the horizontal. For viscosity of 0.981 $N\text{-}S/m^2$ and body speed of 1 m/sec. Determine the lubricant film thickness.	**07**
Q.3	**(a)**	Write Euler's equation of motion. Derive expression for Bernoulli's equation.	**07**
	(b)	A circular lamina 125 cm in diameter is immersed in water so that the distance of its edge measured vertically below the free surface varies 60 cm to 150 cm respectively. Find the total pressure force due to water on one side of the lamina and vertical distance of the center of pressure below the water surface.	**07**
		OR	
Q.3	**(a)**	What is meta center? Explain how metacentric height is determine analytically?	**07**
	(b)	A uniform rectangular body 2 m long, 1 m wide and 0.8 m deep floats in water, the depth of immersion being 0.6 m. What is the weight of the body? Find also the position of metacenter. Is the equilibrium is stable?	**07**
Q.4	**(a)**	What is flownet? Write uses of flownet. Explain various methods to obtain flownet.	**07**
	(b)	A horizontal pipe, 12 cm in diameter is joined by sudden enlargement to a 15 cm diameter pipe. Water is flowing through it at rate of 2 m^3/min. Find the loss of head due to sudden expansion and the pressure difference in the two pipes. If the change of section is gradual without any loss, what would be the change in pressure?	**07**
		OR	
Q.4	**(a)**	Define Hydraulic co-efficient. Derive equation $C_c = C_d / C_v$	**07**
	(b)	Water flows over a rectangular weir 1 m wide at a depth of 150 mm and afterwards passes through a triangular right angled weir. Taking Cd for rectangular and triangular weir as 0.62 and 0.59 respectively. Find the depth over triangular weir.	**07**

Q.5	**(a)**	Write brief note on: (1) Types of notches (2) Ogee wier	**07**
	(b)	Given the velocity field $V = y^2 i - 6xj$, obtain the equation of the streamline passing through (1, 1).	**07**

OR

Q.5	**(a)**	Define stagnation pressure. Obtain an expression for stagnation pressure of compressible fluid in terms of mach number and pressure.	**07**
	(b)	Write the statement of continuity equation and derive the expression.	**07**

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