Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III EXAMINATION – WINTER 2015

Subject Code:130602 **Date:07/01/2016**

Subject Name: Fluid Mechanics

Time: 2:30pm to 5:00pm **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 the following terms: (i) Dynamic viscosity (ii) Ideal fluid (iii) Non-newtonion fluid (iv) Newtonion fluid (v) Weight density (vi) Specific gravity (vii) Specific volume	**07**
	(b)	A circular plate of diameter 1 m is immerged in a liquid of specific gravity 0.9 with its plane making an angle of 30^0 with horizontal. The center of the plate is at a depth of 2 m below the free surface. Calculate (1) total pressure force on one side of the plate (2) location of the center of pressure.	**07**
Q.2	**(a)**	Define atmospheric pressure. Enlist different types of pressure and explain difference between U-tube differential manometer and inverted U-tube manometer.	**07**
	(b)	A U-tube manometer contains the mercury as menometric liquid. One end of manometer is connected to a pipe in which a fluid of specific gravity 0.8. The level of mercury in right limb is 8 cm above the center of pipe. Calculate pressure of fluid in a pipe when the difference of mercury level in two limb is 18 cm.	**07**
		OR	
	(b)	Differentiate between notch and weir. Classify the weirs on basis of shapes of crest and describe all in brief.	**07**
Q.3	**(a)**	A solid wooden cylinder of 3 m diameter and 2 m height floating in water with its axis is vertical. Find metacentric height of cylinder. Specific gravity of wood=0.6	**07**
	(b)	What is flownet? Write uses of flownet and explain various methods in brief to Obtain flownet.	**07**
		OR	
Q.3	**(a)**	State the Bernoulli's equation and write the assumption made in it.	**07**
	(b)	A rectangular notch of crest width 0.5 m is used to measure the flow of water in a rectangular channel. 0.6 m wide and 0.45 m deep. If the water level in the channel is 0.25 m above the weir crest, find the discharge in the channel. Take C_d=0.63 and take velocity of approach in to account.	**07**
Q.4	**(a)**	Derive an expression for the total pressure and position of centre of pressure on a plane surface immersed vertically in a liquid.	**07**

	(b)	What is flownet? Write uses of flownet and explain various methods in brief to Obtain flownet.	**07**

OR

Q.4	**(a)**	Stream function is represented by $\Psi=x^2+y^2$. Find the velocity and direction at point P (1, 3). Also sketch the stream lines.	**07**
	(b)	Explain (1) coefficient of velocity (2) coefficient of contraction (3) coefficient of discharge	**07**
Q.5	**(a)**	What is metacentre? Explain how metacentric height is determined analytically.	**07**
	(b)	A venturimeter having inlet and throat diameter of 200 mm and 100 mm respectively is fitted in a pipe conveying water. The pressure intensity at inlet is 130 KN/m^2 and vacuum pressure head of 35 cm of mercury at throat. Assuming 4 percent of the differential head is lost between inlet and throat section, find the rate of flow	**07**

OR

Q.5	**(a)**	An airplane travel in air at 10^0 C at a speed of 1600 km/hour. Find the mach number and mach angle. Take K=1.4 and R= 287 J/kg^0k	**07**
	(b)	What do you mean by venturihead? Derive expression for rate of flow through venturimeter	**07**

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