Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III EXAMINATION – SUMMER 2015

Subject Code: 130602 **Date:29/05/2015**

Subject Name: FLUID MECHANICS

Time: 02.30pm-05.00pm **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)**	What do you understand by fluid? What are the types of fluid? Enlist the properties fluid and define any two of them.	**07**
	(b)	State and prove Pascal's law with reference to pressure intensity in a static fluid.	**07**
Q.2	**(a)**	Explain with sketch the relationship between the absolute pressure, atmospheric pressure and gauge pressure.	**07**
	(b)	A 1m wide and 1.5m deep rectangular plane surface lies in water in such a way that its plane makes an angle of 30˚ with the free water surface. Determine the total pressure and position of centre of pressure when the upper edge is 0.75m below the free water surface.	**07**
		OR	
	(b)	A rectangular plain surface is 2 m wide and 4 m deep. It lies in vertical plane in water. Determine the total pressure force and position of centre of pressure on the plane surface when its upper edge is horizontal and (i) coincides with water surface and (ii) 2.5 m below the free surface.	**07**
Q.3	**(a)**	What is meta centric height? Explain analytical Method to determine Meta centric height of a floating body.	**07**
	(b)	Weight of a stone in air is 530N and reduces to 200 N while submerging it into water. Find the specific gravity of the stone.	**07**
		OR	
Q.3	**(a)**	Derive continuity equation in three dimensions.	**07**
	(b)	What is flow net? State properties, applications and limitations of flow net.	**07**
Q.4	**(a)**	Derive expression for discharge through Venturimeter.	**07**
	(b)	Derive Darcy-Weisbach equation for head loss due to friction in pipe.	**07**
		OR	
Q.4	**(a)**	Classify orifice and mouth piece on various basis.	**07**
	(b)	Find the discharge over a rectangular notch of 1.5m length when the constant head over the notch is 250 mm. Take C_d = 0.60. Neglect end contraction.	**07**
Q.5	**(a)**	Derive an expression for discharge over a rectangular notch.	**07**
	(b)	Derive Bernoulli's equation for the flow of an incompressible friction less fluid from consideration of momentum.	**07**
		OR	
Q.5	**(a)**	Explain stream function and velocity potential function.	**07**
	(b)	A stream function in a two dimensional flow is $\psi = 2xy$. Calculate the velocity at the point (3, 2).	**07**

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