Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III EXAMINATION – SUMMER 2015

Subject Code:130101 **Date:02/06/2015**

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 is Capillarity?Derive an expression for capillary rise in case of water.	**07**
	(b)	Calculate the capillary rise in a glass tube of 3mm diameter inserted in water.Surface tension for water is 0.075 N/m.What will be the percentage increase in capillary height if the diameter of glass tube is 2mm.	**07**
Q.2	**(a)**	Explain the analytical method of determining the meta centirc height of a floating body.	**07**
	(b)	A logwood 1meter diameter and 2.5 meter long is floating in water.Calculate the depth of immersion of logwood in water if the specific gravity of logwood is 0.6	**07**
		OR	
	(b)	The weight of stone is 530N in air and reduces to 200N while submerging it into water find the specific gravity of stone.	**07**
Q.3	**(a)**	What is Pitot tube? How is it used to measure the velocity of flowing water in a pipe.	**07**
	(b)	Explain the construction and working of a Venturimeter and also derive an expression for the discharge through it.	**07**
		OR	
Q.3	**(a)**	Explain the following terms: (i) Laminar and turbulent flow. (ii) Draft tube (iii) Stream tube. (iv) Velocity potential function.	**07**
	(b)	A stream function in a two-dimensional flow is ψ=2xy. Calculate the velocity at the point (3,2). Find the corresponding velocity potential φ.	**07**
Q.4	**(a)**	What is similarity? What are the various types of it? Explain.	**07**
	(b)	The lift force F_L on the air foil depends upon the mass density ρ of the medium, velocity of flow V, characteristic length d, the viscosity μ ,and angle of attach α. obtain an expression for the lift force by using Buckingham's π theorem.	**07**
		OR	
Q.4	**(a)**	Derive Hagen-Poiseuille equation for laminar flow in the circular pipe.	**07**
	(b)	Derive an expression for power absorbed in foot step bearing.	**07**

Q.5 **(a)** Define the following terms : **07**

(i) Mach number
(ii) Subsonic flow
(iii) Sonic flow
(iv) supersonic flow
(v) Mach angle
(vi) Mach cone
(vii) Zone of action

(b) Calculate the velocity of a supersonic aircraft flying at an altitude of 1000m where the temperature is 280K sound of air craft is heard 2.15 sec. after the passage of the air craft on the head of an observer. **07**
Take k = 1.4 and R = 287 J/kg-K.

OR

Q.5 **(a)** Define stagnation pressure. Derive an expression for that. **07**

(b) Explain Reynolds' experiment with neat sketch. **07**

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