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

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2152003 **Date:01/05/2017**

Subject Name: FLUID MECHANICS & MACHINES

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.**

			MARKS
Q.1		**Define the following terms:**	**14**
	1	Dynamic viscosity	
	2	Sudden contraction	
	3	Bulk modulus of elasticity	
	4	Hydrostatic law	
	5	Archimedes' principle	
	6	Metacenter	
	7	Path line	
	8	Stream function	
	9	Rotation	
	10	Control volume	
	11	Minor loss	
	12	Unit quantity	
	13	Effective head	
	14	Surging	
Q.2	**(a)**	Differentiate between Newtonian – Non Newtonian fluid.	**03**
	(b)	Define the Capillary effect and derive the equation for capillary rise with sketch.	**04**
	(c)	State and prove Pascal's law.	**07**
		OR	
	(c)	How will you determine the metacentric height of a floating body experimentally? Explain with neat sketch.	**07**
Q.3	**(a)**	Enlist different forces present in a fluid flow. For the Euler's equation of motion which forces are taken into consideration?	**03**
	(b)	Describe the terms atmospheric, absolute, gauge and vacuum pressure with neat sketch.	**04**
	(c)	Obtain an expression for continuity equation for a three dimensional flow.	**07**
		OR	
Q.3	**(a)**	Define center of pressure, vapor pressure and buoyancy.	**03**
	(b)	The two velocity components are given and from that determine the third component of velocity such that they satisfy the continuity equation: $v = 2y^2$, $w = 2xyz$	**04**
	(c)	Derive Euler's equation of motion for a steady and incompressible fluid.	**07**
Q.4	**(a)**	Differentiate clearly between Impulse turbine and Reaction turbine.	**03**
	(b)	Determine the total pressure and center of pressure on an isosceles triangular plate of base 4 m and altitude 4 m when it is immersed vertically in an oil of specific gravity 0.9. The base of plate coincides with the free surface of oil.	**04**
	(c)	Define displacement thickness. Derive an expression for the displacement thickness.	**07**

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OR

Q.4	**(a)**	Define the following terms: Boundary layer thickness, Laminar sub-layer, Drag	**03**
	(b)	How will you classify the turbines?	**04**
	(c)	Derive Darcy's equation to find out loss of head due to friction in pipes.	**07**
Q.5	**(a)**	Define the following terms: Priming, NPSH, Draft Tube	**03**
	(b)	Compare Reciprocating pump with Centrifugal pump.	**04**
	(c)	Define the specific speed of a centrifugal pump. Derive an expression for the same.	**07**

OR

Q.5	**(a)**	Define the following terms related to Centrifugal pump: Suction head, delivery head, manometric head	**03**
	(b)	Write short note on Air vessel.	**04**
	(c)	A Kaplan turbine runner is to be designed to develop 9100 kW. The net available head is 5.6 m. If the speed ratio = 2.09, flow ratio = 0.68, overall efficiency = 86% and the diameter of the boss is $1/3^{rd}$ the diameter of runner. Find the diameter of runner, its speed and the specific speed of the turbine.	**07**

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