Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV • EXAMINATION – WINTER 2013

Subject Code: 143403 **Date: 26-12-2013**

Subject Name: Fluid Mechanics and Machinery

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.**

Q.1	**(a)**	Define the following fluid properties. i) Specific gravity ii) Viscosity iii) Compressibility	**07**
	(b)	What is momentum equation? How to determine the force exerted by a flowing liquid on a pipe bend by using momentum equation?	**07**
Q.2	**(a)**	Describe Laminar boundary layer, Turbulent boundary layer & Boundary layer thickness.	**07**
	(b)	How to find the loss of head due to friction in pipes by using Darcy formula? What is the reason for minor energy losses in pipes and what are the causes for minor loss of energy?	**07**
		OR	
	(b)	Find the head loss due to sudden change of diameter from 200 mm to 300 mm. The rate of flow of water through the pipe is 150 liters/sec.	**07**
Q.3	**(a)**	How the dimensionless numbers obtained? What are the important dimensionless numbers? Explain about Reynold's Number.	**07**
	(b)	Write a short note on Model laws & Buckingham's π theorem.	**07**
		OR	
Q.3	**(a)**	Define Surface tension. Obtain the relationship between Surface tension & pressure inside a droplet of liquid in excess of outside pressure.	**07**
	(b)	What is capillarity? Obtain an expression for capillary rise of a liquid.	**07**
Q.4	**(a)**	Derive Euler's equation of motion by considering the motion of a fluid element along a stream line.	**07**
	(b)	Define Specific Speed? What is the significance of Specific Speed? Calculate the specific speed of the turbine which develops 5625 KW power under a head of 25 meters at 120 rpm.	**07**
		OR	
Q.4	**(a)**	Obtain an expression for the work done by impeller of a centrifugal pump on water per second per unit weight of water.	**07**
	(b)	Define Turbine. How Hydraulic turbines are classified? What is Hydraulic efficiency of a turbine?	**07**
Q.5	**(a)**	What is a reciprocating pump? How reciprocating pumps will classify? Write a short note on Indicator Diagrams.	**07**
	(b)	What is an Air vessel? Where it will be fitted and what is the purpose of it? Explain the working of air vessels with reciprocating pumps.	**07**
		OR	
Q.5	**(a)**	What are the different types of Positive Displacement Rotary Pumps? Explain about any one.	**07**
	(b)	Define Pipes in series. What is the expression for finding the total head loss in pipes (a) with minor losses, (b) neglecting minor losses, (c) Co-efficient of friction is same for all pipes.	**07**

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