Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – SUMMER • 2014

Subject Code: 130502 Date: 04-06-2014

Subject Name: Fluid Flow Operation

Time: 02.30 pm - 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)**	Describe the behavior of Newtonian and Non Newtonian fluid with the help of figure and example.	**07**
	(b)	State the assumptions and derive Bernoulli's equation without friction.	**07**
Q.2	**(a)**	Discuss in detail about continuous gravity decanter.	**07**
	(b)	Calculate the power to pump a liquid at the rate of 1.5 kg/s from a ground level tank at atmospheric pressure through a 50mm ID steel pipe to a overhead tank 3m above at 2 kg/cm2 pressure. The distance between two tanks is 500m. Efficiency of the pump is 70%. The density and viscosity of the liquid is 1500 kg/m3 and 20 cp respectively. Friction factor f =16/NRe.	**07**
		OR	
	(b)	Discuss the concept of hydrostatic equilibrium and derive mathematical condition of hydrostatic equilibrium.	**07**
Q.3	**(a)**	Explain fully developed flow. Also discuss concept of transition length for laminar and turbulent flow.	**07**
	(b)	Derive Hagen-Poiseuille equation	**07**
		OR	
Q.3	**(a)**	Explain in detail : Drag and drag coefficient	**07**
	(b)	Describe Reynolds experiment in brief .Water of density 1 gm/cc and viscosity 1 cp is flowing in a pipe of 25mm ID at the rate of 1000 kg/min. Calculate the Reynolds number and find the type of flow.	**07**
Q.4	**(a)**	What is meant by cavitation and priming? Explain the different characteristic curve of the centrifugal pump with neat sketches.	**07**
	(b)	Write a note on types of Fluidization and applications of Fluidization	**07**
		OR	
Q.4	**(a)**	Write a note on Gate valves and Globe valves	**07**
	(b)	Discuss the principle and working of a Reciprocating pump.	**07**
Q.5	**(a)**	Explain any one method of dimensional analysis with suitable example.	**07**
	(b)	Discuss construction and working of a venturi meter and derive equation for volumetric flow rate for the same.	**07**
		OR	
Q.5	**(a)**	With the help of a neat sketch explain the principle and working of a Rotameter	**07**
	(b)	Water is to be pumped from ground level tank, which is open to atmosphere to a cooling tower. The difference between the level of water in the tank and discharge point is 15 m. The velocity of water through 40 mm internal diameter discharge pipe is 3 m/s. In the pipe line there is a valve which is equivalent to 200 pipe diameters and fitting equivalent to 150 pipe diameters. The length of the entire is 30 meters. Calculate the power requirement of the pump if efficiency of pump is 60%. Data : density of water = 1000 kg / m3 Viscosity of water = 0.0008 Pa.s Friction factor 'f' = 0.004	**07**

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