GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-III • EXAMINATION – SUMMER 2013

Subject Code: 130502Date: 04-06-2013Subject Name: Fluid Flow OperationTime: 02.30 pm - 05.00 pmTime: 02.30 pm - 05.00 pmTotal Marks: 70				
Q.1	(a)	 i) Differentiate between real fluids and ideal fluids. ii) Give type and examples of non-Newtonian fluids. iii) Define viscosity and write the units of viscosity. iv) Derive the manometric equation from hydrostatic equilibrium equation. 	08	
	(b)	Explain the principle and working of gravity decanter along with a neat sketch. Write the major equations.	06	
Q.2	(a)	 i) Differentiate between laminar flow and turbulent flow. ii) 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. 	03 04	
	(b)	Derive the Bernoullis equation. Write the necessary assumptions. Explain the corrections applied to it. OR	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/cm ² pressure. The distance between two tanks is 500m. Efficiency of the pump is 70%. The density and viscosity of the liquid is 1500 kg/m ³ and 20 cp respectively. Friction factor $f = 16/N_{Re}$.	07	
Q.3	(a)	With a neat sketch explain the construction and working of a venturimeter	07	
	(b)	Explain boundary layer separation and wake formation.	07	
		OR		
Q.3	(a)	Discuss different types of flow measuring devices along with their utility	07	
	(b)	Sulfuric acid of density 1300 kg/m ³ is flowing through a pipe of 50mm	07	

(b) Sulfuric acid of density 1300 kg/m³ is flowing through a pipe of 50mm ID. An orificemeter of 10mm diameter is fitted in the pipe. A mercury (sp. gr 13.6) manometer fitted to the system measures the differential pressure as 10cm. Calculate the mass flow rate of the acid in kg/hr. Assume orifice coefficient as 0.61.

Q.4	(a)	i) Differentiate between skin friction and form friction.ii) Calculate the equivalent diameter for a fluid flowing in the annulus space between a 40mm and 50mm diameter pipe. Neglect pipe wall thickness.	03 04
	(b)	Draw the characteristic curves for a centrifugal pump and explain them.	07
		OR	
Q.4	(a)	Define: i) Drag coefficient, ii) Mach number, iii) NPSH	06
	(b)	Describe different types of pumps which are used in chemical industry and their application.	08
Q.5	(a)	i) Explain the term cavitation. How do you avoid cavitation?ii) Differentiate between a pipe and tube.	04 03
	(b)	Explain fluidization process and their application in industry.	07
		OR	
Q.5	(a)	Describe different types of valves and their process application.	07
	(b)	List the different dimensional analysis methods and explain any one	07

method with the help of a proper example.