

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III • EXAMINATION – SUMMER 2013****Subject Code: 130502****Date: 04-06-2013****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) i) Differentiate between real fluids and ideal fluids. **08**
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.

- (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. **03**
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. **04**

- (b) Derive the Bernoulli's equation. Write the necessary assumptions. Explain the corrections applied to it. **07**

OR

- (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 $f = 16/N_{Re}$. **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 and application. **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. **07**

- Q.4 (a) i) Differentiate between skin friction and form friction. 03**
ii) Calculate the equivalent diameter for a fluid flowing in the annulus 04
space between a 40mm and 50mm diameter pipe. Neglect pipe wall thickness.
- (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 08**
and their application.
- Q.5 (a) i) Explain the term cavitation. How do you avoid cavitation? 04**
ii) Differentiate between a pipe and tube. 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.
