GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– III (NEW) EXAMINATION – SUMMER 2022

Subject Code:3130502   **Date:11-07-2022**

Subject Name:Fluid Flow Operations

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Define mass velocity, ideal fluid, and real fluid.	**03**
	(b)	Explain the Boundary layer, its separation, and wake formation.	**04**
	(c)	Develop the Bernoulli equation for incompressible fluid.	**07**
Q.2	**(a)**	Classify fluid.	**03**
	(b)	Define laminar and turbulent flow.	**04**
	(c)	Develop equation of pressure difference for inclined tube manometer.	**07**
		OR	
	(c)	Develop mathematical expression for hydrostatic equilibrium.	**07**
Q.3	**(a)**	Define potential flow, streamline and stream tubes.	**03**
	(b)	Explain continuous gravity decanter.	**04**
	(c)	Discuss about pressure drop in fluidization.	**07**
		OR	
Q.3	**(a)**	Write the significance of Mach number and acoustic velocity.	**03**
	(b)	Explain centrifugal decanter.	**04**
	(c)	Discuss flow of compressible fluid through convergent-divergent nozzles.	**07**
Q.4	**(a)**	Give barometric equation with nomenclature.	**03**
	(b)	Describe pump work in Bernoulli's equation	**04**
	(c)	Explain construction and working of the Gate valve.	**07**
		OR	
Q.4	**(a)**	Define viscosity and write down its unit.	**03**
	(b)	Describe correction for friction in Bernoulli's equation	**04**
	(c)	Explain the construction and working of the Globe valve.	**07**
Q.5	**(a)**	Define Newtonian and Non-Newtonian fluid.	**03**
	(b)	Water is flowing through a 25 mm internal diameter pipe at the rate of 1 kg/s. Calculate the pressure drop over a length of 100 meters. Data : Friction factor 'f ' = 0.0001 Data: Friction factor 'f ' = 0.0001 Density of water = 1000 kg/m^3 Viscosity of water = 8.0×10^{-4} Pa.s	**04**
	(c)	Crude oil has a specific gravity of 0.91 and a viscosity of 0.124 Pa s is pumped at a rate of 7 l/s through a pipeline 75 mm diameter having a length of 62 m and whose outlet is 3 m higher than its inlet. Determine the power required for the pump if its efficiency is 60%.	**07**

Q.5 **(a)** Define Compressible and Incompressible fluid. **03**

(b) Acetic acid is to be pumped at a rate of 0.02 m^3/s through a 75 mm ID pipeline. Calculate the pressure drop in the pipeline over a length of 70 m. **04**
Data:
Density of acetic acid = 1060 kg/m^3
Viscosity of acetic acid = 0.0025 (N.s)/m^2

(c) A venturi meter is to be fitted in a pipe of 250 mm diameter where the pressure head is 7.6 m of flowing fluid and the flow rate is 8.1 m3/min. Determine the diameter of the throat. Take the coefficient of venturi meter as 0.96. **07**

****