Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 130502 **Date: 02/06/2017**

Subject Name: Fluid Flow Operation

Time: 10:30 AM to 01:00 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)**	Derive the equation to evaluate the differential pressure used in manometers? Under what conditions are inclined manometers preferred? Write the necessary equation for inclined manometer?	**07**
	(b)	Discuss on merits and demerits of orifice meter vis-à-vis venturimeter?	**07**
Q.2	**(a)**	Derive the Bernoulli's equation without friction clearly stating the assumptions made?	**07**
	(b)	A pump draws a solution of sp. gr. 1.84 from a storage tank through 75 mm pipe. The velocity in the suction line is 0.914 m/s. the pump discharges through a pipe of 50 mm diameter to an overhead tank. The end of the discharge pipe is 15.2 m above the level of the solution in the tank. Frictional losses in the entire piping system are 29.9 J/kg. What pressure must the pump develop and what is the power requirement of the pump if efficiency of the pump is 60%?	**07**
		[OR]	
	(b)	Explain hydrostatic equilibrium for stationary fluid and derive barometric equation.	**07**
Q.3	**(a)**	Define friction factor? State its unit? What are different types of friction factor used in piping design? Give their relation? Derive the equation to evaluate the friction factor for an ideal fluid flowing under laminar flow?	**07**
	(b)	Discuss on merits and demerits of centrifugal pump?	**07**
		[OR]	
Q.3	**(a)**	Describe Reynolds experiment in brief. Water of density 1 gm/cc and viscosity 1cP 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**
	(b)	Explain any one method of dimensional analysis with a suitable example.	**07**
Q.4	**(a)**	Explain the construction and working of a pitot tube?	**07**
	(b)	Write a brief note on valves used in chemical industry?	**07**
		[OR]	
Q.4	**(a)**	Give detailed classification of fluids based on Newton's law of viscosity.	**07**
	(b)	Explain the principle construction and working of a rotameter?	**07**
Q.5	**(a)**	Write a note on types and applications of fluidization	**07**
	(b)	Derive Hagen – Poiseuille's equation with its significance.	**07**
		[OR]	
Q.5	**(a)**	What size of orifice is required which would give a pressure difference 41 cm water column for the flow of styrene of specific gravity= 0.9 flowing at $0.055 m^3/s$ in a 250 mm diameter pipe? C_o=0.62	**07**
	(b)	Derive an expression of head loss due to sudden expansion of flow area for steady flow of incompressible fluids.	**07**

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