Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III(New) EXAMINATION – SUMMER 2016

Subject Code:2130502 **Date:04/06/2016**

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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	What is Newton's law of viscosity?	
	2	Differentiate between Compressible and incompressible fluid.	
	3	How absolute viscosity and kinematic viscosity are related? What are their units in practice?	
	4	Write equation of hydrostatic equilibrium showing each term in figure and explaining it.	
	5	Write equation for measuring pressure drop by simple Manometer.	
	6	When gravity Decanter is used?	
	7	What is fully developed flow.	
	8	What is Reynold's No.? How it classifies the flow of fluid?	
	9	How maximum velocity is related to average velocity when there is Newtonian fluid moving in a straight circular pipe?	
	10	Write Bernoulli equation without friction.	
	11	Give equation for angular momentum.	
	12	What is relation between friction factor and Reynold's No. for Laminar flow?	
	13	What is Mach No.?	
	14	Write formula for the NPSH.	
Q.2	**(a)**	.Discuss operating principle of Centrifugal Decanter	**03**
	(b)	Water flowing at 1500 cm^3/sec in a 50 mm diameter pipe is metered by means of a simple orifice meter of Dia. 25mm. If the coefficient of discharge is 0.62 , what will be the reading in a - mercury under water - manometer connected to the to the meter? μ of Water = 0.8 CP, ρ_{Hg} =13.6	**04**
	(c)	Derive equation for Gravity Decanter relating Total depth, depth of each fluid and densities of fluid	**07**
		OR	
	(c)	Air at 20˚C and 2 atm absolute pressure enters a heater through a 50 mm tube at an average velocity of 15 m/s. It leaves the heater through a 65 mm tube at 90˚ C and 1.6 atm absolute pressure. What is average air velocity at the outlet?	**07**

Q.3	**(a)**	Define drag coefficient. Show relationship between Drag co-efficient and Reynold's No.	**03**
	(b)	Discuss velocity Distribution for laminar flow of Newtonian fluids in a circular channel.	**04**
	(c)	Sulfuric acid is pumped at 30 kg/min through a 60 m length of smooth 25 mm pipe. Calculate the drop in pressure. Density = 1840 kg/M^3, Viscosity=25 cp	**07**
		OR	
Q.3	**(a)**	Discuss different types of weir and flow through them.	**03**
	(b)	Discuss construction and working of Rotameter	**04**
	(c)	Derive Bernoulli equation stating all assumptions.	**07**
Q.4	**(a)**	List various types of pumps and their specific application.	**03**
	(b)	List various types of Valves and their specific application.	**04**
	(c)	Discuss construction and working of Centrifugal pump.	**07**
		OR	
Q.4	**(a)**	What are the forces acting on a body falling freely in a fluid..Explain what is terminal velocity.	**03**
	(b)	Explain the term fluidization	**04**
	(c)	Estimate the terminal velocity for 80- to 100-mesh particles of lime stone (ρ_p =2800 Kg/M^3.)falling in water at 30m˚C.D_P for 100 mesh =0.147 mm and D_P for 80 mesh =0.175 mm, μ of Water = 0.8 CP and ρ_{water}= 1000kg/M^3.	**07**
Q.5	**(a)**	.Discuss flow of compressible fluid through convergent-Divergent nozzle.	**03**
	(b)	.Explain difference between fans, Blowers and compressor.	**04**
	(c)	Explain any device to create vacuum.	**07**
		OR	
Q.5	**(a)**	Explain Cavitations in pump and Priming.	**03**
	(b)	Discuss construction and working of reciprocating compressor	**04**
	(c)	Air at 1.7 atm gauge and 15 C enters a horizontal 75 mm steel pipe that is 70 meter long. The flow rate of entering Air is 0.265M3/s. Assuming isothermal flow,what is the pressure at discharge end of pipe? μ of AIr = 0..0174 CP,Take f = .0044	**07**

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