## **GUJARAT TECHNOLOGICAL UNIVERSITY** BE - SEMESTER-III (New) EXAMINATION – WINTER 2015

Subject Code:2130502Date:29/Subject Name: FLUID FLOW OPERATIONTotal MTime: 2:30pm to 5:00pmTotal MInstructions:Total M			:29/12/2015 al Marks: 70	
Q.1		Short Questions	14	
	1	Define: Fluid		
	2	State physical significance of Reynolds number		
	3 4	Calculate the hydraulic radius and equivalent diameter for a duct of square cross section of side 'b'.		
	5	Define sonic, subsonic and supersonic flow.		
	6	What is fluidization?		
	7	State various types of check valves.		
	8	Define NPSH for centrifugal pump.		
	9 10	What is schedule number of nine?		
	10	For measurement of stack gas velocity is used		
	12	Define: Volumetric efficiency of reciprocating pump		
	13	Give significance and field of use of inclined manometer.		
	14	Define: Newton's law of viscosity		
Q.2	<b>(a)</b>	Differentiate between a pipe and tube.	03	
	<b>(b</b> )	Explain the principle and working of gravity decanter along with a neat sketch.	04	
	(c)	Explain the Newtonian and non-Newtonian fluids with suitable figure and examples.	07	
		OR	~-	
	(c)	An oil of density 1.6 gm/cc and viscosity 5.0 cp is pumped from a storage tank at ground floor to the top of a column at a height of 10 m at the rate 2000 kg/min through a pipe of inside diameter 5 cm. Calculate the pumping power required in HP if the pump efficiency is 60%. The losses due to valves and expansion may be taken as 1.5 (kgf)(m) / kg. For friction factor use, $f = 0.0014 + [0.125/NRe^{0.32}]$	07	
Q.3	<b>(a)</b>	Explain: Drag and drag coefficient.	03	
	(b)	Derive an expression of head loss due to sudden expansion of flow area for steady flow of incompressible fluid.	04	
	(c)	Derive the Bernoulli's equation. Write the necessary assumptions. Explain the corrections applied to it	07	
		OR		
Q.3	<b>(a)</b>	Explain what is cavitation and when priming is required in centrifugal pump?	03	
	<b>(b)</b>	Differentiate: Variable head meter and variable area meter	04	
	(c)	Explain in detail about isentropic flow of compressible fluid through nozzle.	07	
Q.4	(a)	Define: Potential Flow, Stream lines & stream tubes.	03	
	(b)	Explain flow in boundary layers?	04	

	(c)	State types of reciprocating pumps and explain any one of them in details?	07
		OR	
<b>Q.4</b>	<b>(a)</b>	Differentiate between laminar flow and turbulent flow.	03
	<b>(b)</b>	Explain: Characteristic curves of centrifugal pump.	04
	(c)	Sulfuric acid of Specific gravity 1.3 is flowing through a pipe of 8.0 cm ID.	07
		An orifice meter of 2.0 cm diameter is fitted in the pipe. A mercury (sp. gr.	
		13.6) manometer fitted to the system measures the differential pressure as	
		15.0 cm. Calculate the mass flow rate of the acid in kg/hr. Assume orifice	
		coefficient as 0.61.	
Q.5	<b>(a)</b>	State types of fluidization.	03
	<b>(b)</b>	Discuss the effect of friction factor for rough tube.	04
	(c)	Write a short note on prevention of leakage around moving parts.	07
		OR	
Q.5	<b>(a)</b>	State various types of fluid transport system.	03
	(b)	A pitot tube with a discharge co-efficient of 0.9, is connected to a manometer containing water. A light oil with specific gravity of 0.8 is	04
		flowing through a pipe line of 8.0 cm ID. When the pitot tube is kept at	
		the centre of the pipe, the manometer reads 9.0 cm. calculate the flow rate of the oil if the average velocity is 80% of the maximum.	
	(c)	List the different dimensional analysis methods and explain any one method with the help of a proper example.	07

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