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GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Third Semester – Regular) Examinations, December – 2020

BPCCH3030 / BPCPR 3030 FLUID MECHANICS

(Chemical Engineering & PCPR)

Time: 2 hrs

Maximum: 50 Marks

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)(1 x 10 =10 Marks)

Q.1. Answer ALL questions

	[CO#]	[PO#]
a. Toothpaste is	1	1
(i) Bingham plastic		
(ii) Pseudo plastic		
(iii) Newtonian fluid		
(iv) Dilatant		
b. An open tank contains oil with the height and density of 5m and 800kg/m ³ respectively. The pressure acting at the bottom is -----	1	1
(i) 39240N/m ²		
(ii) 100N/m ²		
(iii) 3500N/m ²		
(iv) 10N/m ²		
c. Local velocity of a fluid along a stream line can be measured by	1	1
(i) Pitot tube		
(ii) Venturi meter		
(iii) Rotameter		
(iv) Orifice meter		
d. Operation of a rotameter is based on		
(i) variable flow area	1	1
(ii) rotation of a turbine		
(iii) pressure drop across a nozzle		
(iv) pressure at a stagnation point		
e. Consider a duct of square cross section of side “b”. The hydraulic radius is given by	2	2
(i) b/8		
(ii) b/4		
(iii) b/2		
(iv) b		
f. Losses for flow through valves and fittings are expressed in terms of	2	2
(i) drag coefficient		
(ii) equivalent length of a straight pipe		
(iii) shape factor		
(iv) roughness factor		
g. The pressure drop across the bed remainseven with the further increase in fluid velocity at the particular regime	3	2
(i) Increase then decrease		
(ii) Decrease		
(iii) Increase		
(iv) Constant		
h. Drag coefficient predicted by stokes law is related to	3	2
(i) 0.5		
(ii) 0.44		
(iii) $\frac{24}{Re}$		
(iv) $Re^{0.5}$		
i. Cavitation in a centrifugal pumps can be avoided by keeping the	4	2
(i) suction pressure high		
(ii) delivery pressure low		
(iii) suction pressure low		
(iv) delivery pressure high		
j. The function of check valve is to	4	2
(i) Throttling the flow		
(ii) Allow the flow in one direction		
(iii) Fully open or fully close the flow		
(iv) prevent leakage		

PART – B: (Short Answer Questions)**(2 x 5 = 10 Marks)**Q.2. Answer ALL questions

	[CO#]	[PO#]
a. Differentiate between Newtonian and non-Newtonian fluid.	1	1
b. What is the continuity equation?	1	2
c. Define fanning friction factor.	2	2
d. What is hindered settling?	3	2
e. Write the classification of pump.	4	2

PART – C: (Long Answer Questions)**(6 x 5 = 30 Marks)**Answer ANY FIVE questions

	Marks	[CO#]	[PO#]
3. State the Bernoulli's theorem. State the assumption and derive the Bernoulli's equation.	(6)	1	1
4. Explain orifice meter principle and construction to measure the flow rate of fluid with the help of simple sketch.	(6)	1	2
5. Ammonia at atmospheric pressure and 300 K with a bulk stream velocity of 10 m/s flows in a pipe of id 25 cm. Calculate the pressure drop per 100 m length of pipe. Friction factor $f = 0.079Re^{-0.25}$ in the turbulent regime. Viscosity of ammonia is 10.2×10^{-6} kg/m s and density is 0.6906 kg/m^3	(6)	2	2
6. Discuss the minor losses in the pipeline.	(6)	2	2
7. The pressure difference ΔP depends on the pipe diameter (D), pipe length (L), stream velocity (V), fluid density (ρ), fluid viscosity (μ) and pipe roughness (e). Using Buckingham Pi method obtained an expression for ΔP	(6)	3	1
8. Derive a relation for finding the terminal settling velocity of a spherical particle when Stokes law is applicable.	(6)	3	1
9. Explain centrifugal pump parts, principle and working with simple sketch.	(6)	4	2
10. Explain gate valve, globe valve and ball valves operation and its applications.	(6)	4	1

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