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## GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Third Semester Regular) Examinations, December – 2023

### 22BCHPC23002 – Fluid Mechanics

(Chemical)

Time: 3 hrs

Maximum: 70 Marks

(The figures in the right hand margin indicate marks)

#### PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

	CO #	Blooms Level
a. What is Vena –Contracta? How Cc, Cd & Cv are related?	CO1	K3
b. Why the length of divergent section of a venturimeter is much longer than its convergent section?	CO1	K3
c. Write the expression for head loss due to sudden expansion.	CO2	K2
d. Define 'Minimum fluidization velocity'.	CO3	K1
e. Differentiate between gate valve and globe valve.	CO4	K2

#### PART – B

(15 x 4 = 60 Marks)

Answer ALL questions

	Marks	CO #	Blooms Level
2. a. Derive hydrostatic law.	7	CO1	K2
b. A vertical cylinder of diameter 180mm rotates concentrically inside another cylinder of diameter 181.2mm. Both the cylinders are 300mm high. The space between the cylinders is filled with a liquid. Determine the viscosity of the liquid if a torque of 20Nm is required to rotate the inner cylinder at 120rpm.	8	CO1	K3
(OR)			
c. With neat sketch discuss the construction & working principle of venturimeter.	7	CO1	K2
d. A horizontal venturimeter with inlet diameter 30cm and throat diameter 15cm is used to measure the flow of oil of specific gravity 0.8. The discharge of oil through venturimeter is 50lps. Find the reading of oil–mercury differential manometer.	8	CO1	K3
3.a. Explain the Rayleigh’s method of dimensional analysis in details.	7	CO2	K3
b. The pressure difference $\nabla p$ in a pipe of diameter D and length l due to viscous flow depends on the velocity V, viscosity $\mu$ and density $\rho$ . Obtain the expression for $\nabla p$ using Buckingham’s $\pi$ theorem.	8	CO2	K3
(OR)			
c. Derive the relation between skin friction & wall shear.	7	CO2	K3

d.	The resistance force $R$ of a supersonic plane during flight can be considered as dependent upon the length of the aircraft $l$ , velocity $V$ , air viscosity $\mu$ , air density $\rho$ and bulk modulus of air $K$ . express the functional relationship between these variables and resisting force.	8	CO2	K3
4.a.	Explain the continuous fluidization in details.	7	CO3	K3
b.	A bed of ion exchange beads 8ft deep is to be backwashed with water to remove dirt. The particles have a density of $1.24\text{gm/cm}^3$ and an average size of 1.1mm. What is the minimum fluidization velocity using water at $20^{\circ}\text{C}$ and what velocity is required to expand the bed by 25%? The beads are assumed to be spherical and $\epsilon$ is taken as 0.4.	8	CO3	K3
(OR)				
c.	Explain the mechanism of fluidization.	7	CO3	K3
d.	Convert a pressure head of 100m of water to kerosene of specific gravity 0.81 & carbon tetrachloride of specific gravity 1.6.	8	CO3	K3
5.a.	Explain in details about the types of valves.	7	CO4	K2
b.	Explain the working principle of centrifugal pump.	8	CO4	K3
(OR)				
c.	What is NPSH of a centrifugal pump? Why it is necessary to maintain NPSH?	7	CO4	K3
d.	Explain the classification of pumps in details.	8	CO4	K3

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