06-06-2026 SE CHEMICAL SEM-III (NEP-2020) FF QP CODE: 20009478

DURATION: 2 HRS. **MARKS: 60**

N.B. (1) Question No 1 is compulsory
(2) Attempt any three questions out of remaining five questions
(3) Assumption made, if any should be clearly stated
(4) Figures to the right indicate full marks.

Q1	**Solve any Three out of Four**	**15**
a)	What are the various types of losses occurring in pipe?	
b)	Two horizontal plates are placed 1.25 cm apart, the space between them being filled with oil of viscosity 14 poises. Calculate the shear stress in oil if upper plate is moved with a velocity of 2.5 m/s.	
c)	Explain Cavitation in a pump	
d)	Write a short note on Capillarity.	
Q2		
a)	What is an Orificemeter? Derive an expression for the discharge through an Orificemeter.	**10**
b)	Derive an expression for Hagen Poiseuille's equation	**5**
Q3		
a)	An inverted U-tube manometer is connected to two horizontal pipes A and B through which water is flowing. The vertical distance between the axes of these pipes is 30 cm. When an oil of specific gravity 0.8 is used as a gauge fluid, the vertical heights of water columns in the two limbs of the inverted manometer (When measured from the respective centre lines of the pipes) are found to be same and equal to 35cm. Determine the difference of pressure between the pipes.	**10**
b)	Differentiate between NPSHA and NPSHR.	**5**
Q4		
a)	Give the different types of valves and explain any two in details.	**10**
b)	The diameters of a pipe at the section 1 and 2 are 15 cm and 20 cm respectively. Find the discharge through the pipe if the velocity of water at section 1 is 4 m/s. Determine also the velocity at section 2.	**5**
Q5		
a)	A gas is flowing through a horizontal pipe which is having area of cross section as 40 cm^2 ,where pressure is 40 N/cm^2 (gauge) and temperature 15 ^oC. At another section the area of cross section is 20 cm^2 and pressure is 30 N/cm^2 (gauge). If the mass rate of flow of gas through the pipe is 0.5 kg/s, find the velocities of the gas at these sections, assuming an isothermal change. Take R= 292 N-m/ (kg ^{o} K), and atmospheric pressure = 10 N/cm^2.	**10**
b)	Explain the rheological behavior of fluid	**5**
Q6		
a)	Define:1) Skin Friction 2) Form Friction.	**10**
b)	What is the significance of Mach Number?	**5**

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