



III SEMESTER B.TECH. (CHEMICAL ENGINEERING) MAKE UP EXAMINATIONS, DECEMBER 2017 SUBJECT: MOMENTUM TRANSFER [CHE 2102] REVISED CREDIT SYSTEM

## DATE: 20/12/2017, TIME: 9-12 PM

Time: 3 Hours

MAX. MARKS: 50

## Instructions to Candidates:

✤ Answer ALL the questions.

✤ Missing data may be suitable assumed.

1A.	Find the pressure and density at a height of 7 Kms, if the corresponding values at sea level are 101 KN/m <sup>2</sup> and 1.235 Kg/m <sup>3</sup> assuming the isothermal conditions. Derive the equation used.	04
1B.	Define Newton's law of viscosity. Find the kinematic viscosity of oil of density 981kg/m <sup>3</sup> . The shear stress at a point in oil is 0.2452 N/m <sup>2</sup> and velocity gradient at that point is 0.2 per second.	04
1C.	Define: i) Hydraulically smooth pipe ii) Steady flow	02
2A.	Explain briefly on Moody's and Vonkarmen's charts.	02
2B.	Derive the equations for shear stress and velocity distribution in a steady, incompressible laminar flow through a circular pipe	04
2C.	Explain the principle and working of venturimeter. Derive the working equation and prove that the venturimeter is a variable head meter.	04
3A.	Derive Darcy's equation. State all the assumptions.	04
3B.	Water is to be pumped from ground level tank to a cooling tower. The difference between the level of water in the tank and discharge point is 15 meters. The velocity of water through 40mm internal diameter discharge pipe is 3m/s. The length of the entire pipe is 30 m. Calculate the power required to pump if the efficiency of the pump is 60%. Use appropriate equation for calculating friction factor.	04
3C.	Define i) Prandtl's mixing length ii) Mach number	02
4A.	Explain the concept of boundary layer in fluid flow through circular pipe.	03
4B.	Explain the hydrodynamics of fluidization? What are the different applications of fluidized beds?	04
4C.	Derive an equation for the discharge through a triangular notch.	03

5A.	Briefly explain the different types of pipe fittings and their applications.	03
5B.	With a neat sketch, explain the principle and working of a centrifugal pump.	04
5C.	Write a brief note on Buckingham $\pi$ theorem of dimensional analysis.	03

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