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Question Paper Code: 57901

B.E./B.Tech. DEGREE EXAMINATION, DEC 2020

Seventh Semester

Chemical Engineering

15UCH701 - TRANSPORT PHENOMENA

(Regulation 2015)

Duration: One hour

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The fundamental law used for momentum transfer is CO1- R
(a) Fourier's law (b) Fick's law
(c) Newton's law (d) Eyring model
2. What is the velocity of fluid at the wall of a pipe? CO1- R
(a) Unity (b) Zero (c) Infinity (d) None of the above
3. Newton's law is used for CO2- R
(a) Momentum transfer (b) Mass transfer
(c) Heat transfer (d) electrical energy
4. _____ have only magnitude CO2- R
(a) Vector (b) Scalars (c) Substantial derivative (d) Total derivative
5. $\alpha = K/\rho C_p$ is CO3- R
(a) Fourier law (b) Temperature gradient
(c) Thermal diffusivity (d) All of the above
6. In free convection Nusselt number depends on CO3- R
(a) Reynolds number (b) Fourier law
(c) Grashoff number (d) all of these

7. The ratio of mass concentration of species A to the total mass density of the mixture is known as CO4- R
- (a) Mass density (b) Concentration (c) Mole fraction (d) Mass fraction
8. What is the unit of diffusion coefficient? CO4-R
- (a) m^2 . (b) s. (c) $m^2 s$ (d) m^2/s .
9. Temperature and velocity profiles are identical when the dimensionless Prandtl number is a CO5- R
- (a) 1 (b) 2 (c) 3 (d) 4
10. Consider the above problem, estimate the value of Reynolds number CO5- R
- (a) 0.12 (b) 0.13 (c) 0.14 (d) 0.15

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Write a detail note on rheological models CO1-U (8)
12. Explain the step by step procedure for Shell momentum balance and boundary conditions for solving viscous flow problems CO2-U (8)
13. A thick walled cylindrical tubing of hard rubber having an inside radius of 5mm and outside radius of 20 mm is being used as temporary cooling coil in a bath. Ice water is flowing rapidly inside, and the inside wall temperature is 274.9 K. The outside surface temperature is 297.1 K. A total of 14.65 W. heat must be removed from the bath by the cooling coil. How many m of tubing are needed? The thermal conductivity is 0.151W/m.K CO3-App (8)
14. Arrive the molar flux equation for the homogenous chemical reaction between gas(A) and liquid (B) CO4- App (8)
- $A + B \rightarrow AB$
15. State the nusslet number an prove it CO5-U (8)