Reg. No. :

Question Paper Code: 2037081

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024
Seventh Semester
Chemical Engineering
U20CH701– TRANSPORT PHENOMENA
(Regulation R2020)

Time: Three Hours   Maximum: 100 Marks

Answer ALL questions

PART – A   (10 x 2 = 20 Marks)

1.   What do you understand from the term rheology?

2.   Explain how viscosities of liquids and gases depend on the temperature.

3.   State Newton's law of Viscosity.

4.   Illustrate shell momentum balance for steady state system.

5.   Name the various modes of heat transfer with examples.

6.   Outline the boundary conditions used in heat transfer problems.

7.   Define Fick's law.

8.   What is diffusion in transport system? Give one suitable example.

9.   What is analogy?

10. Infer the significance of Reynolds's number.

PART – B   (5 x 16 = 80 Marks)

11.(a)(i) Explain with neat figure the effect of temperature and pressure on viscosity.   (8)

(ii) Summarize the procedure followed for shell momentum balance.   (8)

<div align="center">(OR)</div>

(b)   Classify Newtonian and non-Newtonian fluid with suitable examples.   (16)

12. (a)   Develop the flux distribution and velocity profiles for fluid flow through a circular tube.   (16)

<div align="center">(OR)</div>

(b)   Interpret the various forms of Navier's stokes equation and their applications. (16)

13. (a)   Develop the expression for temperature profile and heat flow at the surface for heat conduction with an electrical heat source.   (16)

<div align="center">(OR)</div>

b)(i)   Demonstrate the procedure to solve heat transport problems.   (8)

(ii)   Heat is being generated uniformly by a chemical reaction in long cylinder of radius 91.44 mm. The generation rate is constant at 46.6 W/m^3. The walls of the cylinder are cooled so that the wall temperature is held constant at 311K. The thermal conductivity is 0.865 W/mK. Calculate the centerline temperature.   (8)

14. (a)   Develop the expression of concentration profile and molar flux for diffusion through a stagnant gas film.   (16)

<div align="center">(OR)</div>

(b)   Examine the procedure involved in determining diffusion co-efficient using Stefan tube method.   (16)

15.(a)(i)   Summarize the application of analogies.   (8)

(ii)   Write short notes on Chilton and Colburn analogy.   (8)

<div align="center">(OR)</div>

(b)   Discuss in detail about the Reynolds's analogy between momentum and heat transport.   (16)

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