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18CH823

Eighth Semester B.E. Degree Examination, July/August 2022
Transport Phenomenon

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain Newtonian and non-Newtonian fluid with examples. **(08 Marks)**
   b. Explain temperature and pressure dependency of viscosity. **(08 Marks)**
   c. Define Fourier law of heat conduction and its terminologies. **(04 Marks)**

OR

2 a. What is Fick's law of diffusion? Define. **(02 Marks)**
   b. Explain the molecular theory of the viscosity of gases and liquids. **(12 Marks)**
   c. Explain about convective momentum transport. **(06 Marks)**

Module-2

3 Derive an expression for average velocity over a cross section of the flow of falling film on a region of length L (include flat plate). **(20 Marks)**

OR

4 a. Develop an equation for the overall heat transfer coefficient for the composite cylindrical pipe wall shown in Fig.Q4(a).
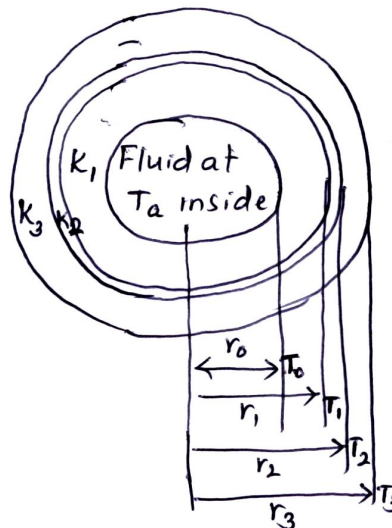

Fig.Q4(a) **(12 Marks)**

   b. Obtain an expression for mass flow rate W for an ideal gas in laminar flow in long circular tube. The flow is isothermal. Assume pressure change across the tube is same. So that velocity is constant. **(08 Marks)**

Module-3

5 a. Derive equation for heat conduction with an electric source. **(12 Marks)**
   b. Explain the dimensionless numbers employed in forced convection and free convection heat transfer. **(08 Marks)**

OR

6   a.   Derive equation for effectiveness of fin.   **(12 Marks)**
     b.   Write a note on equimolar counter diffusion.   **(08 Marks)**

Module-4

7   a.   Derive equation for diffusion through a stagnant gas film.   **(12 Marks)**
     b.   Write a note on diffusion with heterogeneous chemical reaction.   **(08 Marks)**

OR

8   Derive equation for diffusion into a falling liquid film.   **(20 Marks)**

Module-5

9   Write notes on:
     a.   Reynolds analogy   **(07 Marks)**
     b.   Prandtl analogy   **(06 Marks)**
     c.   Colburn analogy   **(07 Marks)**

OR

10   a.   Derive equation of continuity for a binary mixture.   **(12 Marks)**
     b.   Write a note on Navier-Stokes equation.   **(08 Marks)**

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