

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. winter 2022 - 23 Examination

Semester: 7
Subject Code: 203103405
Subject Name: Transport Phenomena

Date: 08/10/2022
Time: 10:30am to 1:00pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions: (Each of one mark): (15)

1. The transport phenomenon occurs only in _____ state of a gas and is _____.
2. Heat transfer takes place in liquids and gases is essentially due to _____.
3. A fluid which does not obeys Newton's law of Viscosity is called _____.
4. Fick's Law explains the _____ transport phenomena.
5. Heat flow doesn't depend on temperature. True/False.
6. Foriur's law involve _____ Transport phenomena.
7. Give the name the mode of transports.
8. What is Pradlt number?
9. The relationship between the shear stress and shear rate in the real fluids are part of _____.
10. The boundary layer thickness at a given section along a flat plate _____ with increasing Reynold's number.
11. The Hagen-Poiseuille equation gives the relationship between _____ . This equation is applicable only for laminar flow where the value of Reynold's number is less than 2100. Transport Phenomena subject covers which subjects?
 (a) Mass flow rate and volumetric flow rate (b) volume rate of flow and pressure drop.
 (c) Pressure and temperature (d) All of the above
12. The equation of continuity is developed by making a _____ balance over a small element of volume through which fluid is flowing.
13. Mention the name of the textbook for Transport Phenomena.
14. What is Free Convention?
15. The macroscopic mechanical energy balance at unsteady state is given by _____.

Q.2 Answer the following questions. (Attempt any three) (15)

- A) What are transport phenomena? How is it related to Chemical Engineering?
- B) Discuss Momentum, Mass, and Energy transport.
- C) Explain the classification of Fluid.
- D) Compare Fourier's law with Newton's law of viscosity.

Q.3 A) Derive velocity distribution for a flow of a Circular pipe. (07)

- B) Derive an expression for heat conduction in a composite cylinder comprised of Three layers. (08)

OR

- B) Give the stepwise procedure to calculate the thermal conductivity of gaseous Mixture. (08)

Q.4 A) Explain the shell balance of momentum with example of falling film. (07)**OR**

- A) Derive the Diffusion through a stagnant gas film (07)

- B) Derive an expression for heat conduction in a composite cylinder comprised of Three layers. (08)