

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2021 - 22 Examination

Semester: 8
Subject Code: 03103451
Subject Name: Transport Phenomena

Date: 28/03/2022
Time: 10:30 am to 01:00 pm
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. _____ states that the shear stress in a flowing fluid is directly proportional to the negative velocity gradient.
2. The macroscopic mechanical energy balance at unsteady state is given by _____.
3. A fluid which obeys Newton's law of Viscosity is called _____.
4. _____ Law explains the mass transport phenomena.
5. Whenever an external force is employed for facilitating heat transfer in a quantum of fluid, the mechanism of heat transfer occurring is called _____.
6. Which law explains the Energy Transport phenomena?
7. Name the different heat sources.
8. What is Grashof number?
9. What are the units of heat transfer coefficient in SI units?
10. What is a Boundary layer?
11. Transport Phenomena subject covers which subjects?
(a) Momentum transport (b) Heat transport
(c) Mass transport (d) All of the above
12. What method of heat transfer do we see in our weather patterns?
(a) Radiation (b) Convection
(c) Conduction (d) All of the above
13. Define: Heat Flux
14. What is meant by Natural Convection?
15. Give any three applications of transport phenomena.

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

- A) What is the importance of Transport Phenomena? Why all are studied together?
- B) Discuss classification of transport processes.
- C) Explain the general shell balance procedure for setting up and solving momentum balance problems and boundary conditions.
- D) Discuss Fourier's Law of heat conduction in brief.

Q.3 A) Derive velocity distribution equation for a flow of a falling film on an inclined plane. (07)

- B) Derive the heat conduction equation with an electrical heat source (08)

OR

- B) Discuss the heat conduction equation with a viscous heat source. (08)

Q.4 A) Derive the heat conduction equation through composite wall (07)

OR

- A) Derive the diffusion (concentration distribution) equation through a stagnant film in detail. (07)

- B) Derive velocity distribution equation for flow through a circular tube. (08)