

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII(NEW) EXAMINATION – SUMMER 2019****Subject Code:2180507****Date:09/05/2019****Subject Name:Transport Phenomena****Time:10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Discuss Classification of transport processes. **03**
(b) Discuss the importance of studying transport phenomena. **04**
(c) State and explain Newton's Law of viscosity and discuss how it is analogous with Fourier's Law of heat conduction and Fick's Law of binary diffusion. **07**
- Q.2** (a) Discuss about the conservation laws **03**
(b) Discuss about shell momentum balance and boundary conditions in general. **04**
(c) Derive velocity distribution for a flow of a falling film. **07**
- OR**
- Q.3** (c) Discuss Navier-Stokes equation in Cylindrical co-ordinate. **07**
(a) Give brief introduction about equimolar counter diffusion. **03**
(b) Derive the equation of continuity. **04**
(c) Derive flux equation of diffusion of A through non-diffusing B. **07**
- OR**
- Q.3** (a) Explain Fick's law of binary diffusion. **07**
(b) Find the temperature distribution for heat conduction due to the viscous heat dissipation for flow of an incompressible Newtonian fluid between two concentric cylinders. **07**
- Q.4** (a) Discuss Fourier's Law of heat conduction in brief. **03**
(b) A copper wire has a radius of 2 mm and a length of 5 m. For what voltage drop what the temperature rise at the wire axis be 10 °C, if the surface temperature of wire is 20 °C? **04**
(c) Discuss heat conduction with chemical heat source. **07**
- OR**
- Q.4** (a) Discuss about temperature and pressure dependency of thermal conductivity. **03**
(b) Discuss in brief about heat conduction in a cooling fin **04**
(c) Discuss heat conduction with electrical heat source. **07**
- Q.5** (a) Define mass and molar average velocities. **03**
(b) Explain in brief about theory of diffusion of polymer **04**
(c) Discuss about diffusion through a stagnant gas film. **07**
- OR**
- Q.5** (a) Define mass and molar concentrations. **03**
(b) Discuss the significance of momentum, thermal and mass diffusivities. **04**
(c) Define concentrations, velocities and mass fluxes with reference to mass transport. **07**
