

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VIII (NEW) EXAMINATION – WINTER 2018****Subject Code: 2180507****Date: 15/11/2018****Subject Name: Transport Phenomena****Time: 02:30 PM TO 05:00 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) Explain the physical quantities encountered in transport phenomena. **03**  
(b) State and explain Conservation Laws. **04**  
(c) Discuss the Transport Phenomena at three different levels. **07**

- Q.2** (a) Explain in brief Newton's Law of Viscosity. **03**  
(b) Discuss the general trends of viscosity with temperature and pressure for ordinary fluids. **04**  
(c) Derive the equation for the temperature distribution in two concentric cylinders. **07**

**OR**

- Q.3** (c) Explain operation of a couette viscometer. **07**  
(a) Discuss in brief Molecular Energy Transport. **03**  
(b) Discuss the commonly used boundary conditions of shell momentum balance. **04**  
(c) Derive equation of momentum flux and velocity distribution for the upward flow in a cylindrical annulus. **07**

**OR**

- Q.3** (a) Discuss the Reynolds number for falling films. **03**  
(b) What is shell momentum balance? Explain the procedure for setting up and solving viscous flow problems. **04**  
(c) Derive the equation of motion. **07**  
**Q.4** (a) Define mass and molar concentration. **03**  
(b) Discuss about shell energy balance and boundary conditions. **04**  
(c) Find the radial temperature distribution within the wire for heat conduction with an electrical source. **07**

**OR**

- Q.4** (a) Discuss mass average and molar average velocity. **03**  
(b) Discuss about binary diffusion and self diffusion. **04**  
(c) Derive the differential equation showing the relation between temperature and the length of reactor stating the various boundary conditions for heat conduction with a chemical heat source. **07**  
**Q.5** (a) Discuss about shell mass balance. **03**  
(b) Compare convective and molecular molar fluxes. **04**  
(c) Discuss theory of diffusion in gases at low density. **07**

**OR**

- Q.5** (a) Explain Molecular Mass Transport. **03**  
(b) Explain temperature and pressure dependence of diffusivities. **04**  
(c) Derive equation of molar flux for steady state diffusion of A through non-diffusing B. **07**

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