

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV • EXAMINATION – WINTER • 2014****Subject Code: 142101****Date: 22-12-2014****Subject Name: Transport Phenomenon in Materials Processing****Time: 02:30 pm - 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) List different modes of heat transfer and differentiate between them. **07**
(b) What is fluid? Give its example and explain any three fluid properties with their units. **07**
- Q.2** (a) State law of conservation of mass and derive equation of mass balance in three dimensions. **07**
(b) State Newton's law of viscosity and classify different types of fluids. Define kinematic viscosity. **07**
- OR**
- (b) State Fourier's law of conduction. Derive general heat conduction equation in rectangular coordinates. **07**
- Q.3** (a) Derive equation for heat conduction through composite wall. **07**
(b) List different types of fluid flows and explain them. **07**
- OR**
- Q.3** (a) Derive general equation of mass diffusion in stationary media. **07**
(b) Derive equation for flow thorough fluidized bed. **07**
- Q.4** (a) Derive differential momentum balance equation. **07**
(b) Explain following terms in term of mass transfer: i) Molar Density ii) Mole Fraction iii) Mass Fraction iv) Fick's Laws of Diffusion. **07**
- OR**
- Q.4** (a) Write note on pseudo steady diffusion. **07**
(b) Explain in terms of Radiation: absorptivity, reflectivity, emissivity and transmissivity. **07**
- Q.5** (a) Give differential momentum balance equation and from it derive eulers' equation. Using Euler' equation derive Bernoulli' equation. **07**
(b) Define mass transfer and explain different mass transfer modes. **07**
- OR**
- Q.5** (a) What do you mean by Black body radiation? Explain. State and explain Planck's Law and Lambert's law. **07**
(b) Derive the equation for the viscosity measurement by stokes' method. **07**
