

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-IV Examination-Nov/Dec-2011

Subject code: 142101

Date: 25/11/2011

Subject Name: Transport Phenomena in Materials Processing

Time: 02.30 pm -5.00 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) Define fluid. Discuss classification of fluids. **07**
(b) Explain fluid properties. Explain different types of fluid flows. **07**

- Q.2** (a) Derive continuity equation for overall mass balance. **07**
(b) Derive Euler's Stokes equation. **07**

OR

- (b) Molten steel is teemed from ladle through a 5 cm dia. Nozzle at its bottom. If the volume of the molten steel in the beginning is 2 m^3 and the linear velocity of discharge is 90 cm/s, calculate the time required to empty the ladle. **07**

- Q.3** (a) What is heat transfer? Write types of heat transfer. Why study of heat transfer is useful in metallurgical processes? **07**
(b) Explain free and forced convection modes of heat transfer. **07**

OR

- Q.3** (a) Explain mass transfer at solid-liquid interface. **07**
(b) Discuss-Mass transfer v/s chemical control. **07**

- Q.4** (a) Define heat transfer by radiation. Explain Absorptivity, Reflectivity and Transmissivity. **07**
(b) Explain concept of Black body radiation. **07**

OR

- Q.4** (a) Discuss Planck's law. **07**
(b) Explain flow through fluidized bed. **07**

- Q.5** (a) Which are the modes of mass transfer? Explain briefly. **07**
(b) Derive general equation of mass diffusion in stationary media. **07**

OR

- Q.5** (a) Define and explain Fourier's law of heat conduction. **07**
(b) Explain steady state heat conduction through composite walls. **07**
