

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- IVth SEMESTER-EXAMINATION – MAY/JUNE- 2012****Subject code: 142101****Date: 23/05/2012****Subject Name: Transport Phenomena in Materials Processing****Time: 10:30 am – 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) Derive equation of continuity for incompressible & steady state laminar fluid flow in rectangular coordinates. **07**

(b) What is Viscosity? State Newton's law of viscosity & derive unit of viscosity. Also classify different types of fluids. **07**

Q.2 (a) Derive momentum balance equation or equation of motion. **07**

(b) Derive Bernoulli's equation from Euler's equation. **07**

OR

(b) Derive an expression for the terminal velocity of a solid sphere falling through a liquid following Stoke's law. **07**

Q.3 (a) Derive general mass transfer equation. **07**

(b) Explain terms : a) Mass & Molar concentrations b) Mass & Molar fractions **07**

OR

Q.3 (a) Explain flow through fluidized bed. **07**

(b) Derive general heat conduction equation in rectangular coordinates. **07**

Q.4 (a) Explain Fourier's law of heat conduction and define thermal conductivity (k). **07**

(b) Derive equation of temperature profile for steady state one dimensional heat conduction through a large plane. **07**

OR

Q.4 (a) Derive equation for radial heat conduction rate 'Q' through the sphere. **07**

(b) Write a short note on different types of convective heat transfer with examples. **07**

Q.5 (a) What is newton's law of cooling ? Give correlations of dimensionless numbers which play important role in natural & forced convections **07**

(b) What is radiation ? Explain absorptivity , reflectivity transmissivity & emissivity. **07**

OR

Q.5 (a) Discuss Black body radiation & lambert's law. **07**

(b) Explain Stefan Boltzman's & Plank's distribution law **07**
