

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-IV EXAMINATION – WINTER 2025****Subject Code:3142110****Date:18-11-2025****Subject Name:Introduction to 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.
4. Simple and non-programmable scientific calculators are allowed.

		Marks
Q.1	(a) With example show that fluid is different than solid.	03
	(b) Define or Explain following fluid properties with their units: Density, Weight Density, Specific Volume, and Specific Gravity.	04
	(c) What are different methods to describe fluid flow? Explain different types of fluid flow.	07
Q.2	(a) What is meant by Flow rate? Derive its unit.	03
	(b) Calculate flow rate & kinematic viscosity of fluid flowing at 3 m/sec velocity through a pipe of 0.2 m diameter, with Reynolds' number 2000.	04
	(c) Define viscosity. State & explain Newton's law of viscosity. Classify fluids.	07
	OR	
	(c) Derive differential mass balance equation for rectangular coordinate system.	07
Q.3	(a) Define kinematic viscosity and get its unit.	03
	(b) Calculate dynamic viscosity for Q.2 (b), if density of fluid is 700 kg/m ³ .	04
	(c) Derive differential momentum balance equation for rectangular coordinate system.	07
	OR	
Q.3	(a) Explain each term of Fourier' law of heat conduction.	03
	(b) Derive heat conductivity unit.	04
	(c) Derive general equation of heat conduction in rectangular coordinate.	07
Q.4	(a) List use of differential balance equation.	03
	(b) Explain: Fluidized bed, Particulate fluidization & Aggregative fluidization.	04
	(c) Write short note on flow rate measuring equipment with their principle, working and construction.	07
	OR	
Q.4	(a) Define mass transfer and different modes of mass transfer.	03
	(b) State and explain Fick's 1 st and 2 nd laws of diffusion.	04
	(c) Explain term: Mass fraction and mole fraction. Also, write brief short note on Kirkindal effect.	07
Q.5	(a) Explain term: emissive power and emissivity.	03
	(b) Define or Explain term with reference to radiative heat transfer: white body, gray body, black body and transparent body.	04
	(c) Write short note on different law involved in radiative heat transfer.	07
	OR	
Q.5	(a) Explain term conduction, convection and radiation for heat transfer.	03

- (b) State and explain Newton's law of cooling. Derive unit of heat connectivity. **04**
- (c) Compare free convection and forced convection. **07**