

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV EXAMINATION – SUMMER 2025****Subject Code: 3142507****Date:12-05-2025****Subject Name: Fluid Mechanics and Heat Transfer****Time: 10:30 AM TO 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.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Explain Newton's Law of Viscosity. **03**
 (b) Define Fluid and explain the types of fluids **04**
 (c) What is surface tension & derive an expression for Surface tension on liquid Droplet & Hollow bubble **07**
- Q.2** (a) What is Buoyancy & Centre of Buoyancy? **03**
 (b) Explain Meta Centre & Meta centric height with neat sketch. **04**
 (c) Derive an expression for Pascal's Law **07**
- OR**
- (c) Derive an expression for vertical plane surface submerged in liquid for Total Pressure force & Centre of Pressure **07**
- Q.3** (a) Explain efficiency and effectiveness of fin **03**
 (b) Explain the types of Flow **04**
 (c) A 30cm diameter pipe, conveying water, branches into two pipes of diameters 20cm and 15cm respectively. If the average velocity in the 30cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15cm pipe if the average velocity in the 20 cm diameter pipe is 2 m/s. **07**
- OR**
- Q.3** (a) Explain black, white and grey body **03**
 (b) Write short notes on venturimeter **04**
 (c) Derive Euler's Equation of motion along a stream line and also Bernoulli's equation from Euler's Equation **07**
- Q.4** (a) Explain Fourier's law of Heat conduction **03**
 (b) List out types of dimensionless numbers & derive an expression for Reynolds Number **04**
 (c) Explain dimensional analysis using Buckingham π -theorem **07**
- OR**
- Q.4** (a) Explain reflectivity & transmissivity **03**
 (b) What are the modes of Heat Transfer and explain them **04**
 (c) Derive equation of Heat conduction **07**
- Q.5** (a) What is Newtons law of cooling **03**
 (b) Write shorts notes on i) Rayleigh-Jeans law ii) Wien's Displacement Law **04**
 (c) Derive an expression for LMTD for parallel flow Heat exchanger **07**
- OR**
- Q.5** (a) Explain Stefan-Boltzmann law **03**

- (b) Explain the types of Heat exchangers
- (c) Explain effectiveness-NTU method for parallel flow arrangement

04
07
