

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-IV (NEW) EXAMINATION – WINTER 2024

Subject Code:3142507

Date:21-11-2024

Subject Name: Fluid Mechanics and Heat Transfer

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.

- Q.1** (a) Highlight the importance of learning the subject fluid mechanics and heat transfer. **03**
(b) State Newton's law of viscosity. What is the effect of temperature on viscosity? **04**
(c) Give a statement for the Pascal's law of pressure at a point. Also explain capillarity and surface tension property of a fluid. **07**
- Q.2** (a) What are the conditions of equilibrium for a floating body and a submerged body? **03**
(b) Define buoyancy and centre of buoyancy. **04**
(c) Deduce an expression for the resultant force and centre of pressure when horizontal plane is submerged under a surface. **07**
- OR**
- (c) Derive an expression for the meta centric height of a floating body. **07**
- Q.3** (a) What is continuity equation in 2-D flow in Cartesian coordinate of system? **03**
(b) Explain the principle and use of venturimeter. **04**
(c) Write a short note on types of fluid flows. **07**
- OR**
- Q.3** (a) Write in brief about Reynolds's number **03**
(b) Determine the dimension of quantity (i) Discharge (ii) Kinematic Viscosity **04**
(c) With usual notation derive Euler's equation of motion along a stream line. **07**
- Q.4** (a) Write a full form of (i) LMTD (ii) NTU with respect to heat exchanger. **03**
(b) What is Fin Efficiency and Fin Effectiveness? **04**
(c) Describe conduction, convection and radiation mode of heat transfer with example. **07**
- OR**
- Q.4** (a) Write applications of heat exchanger. **03**
(b) What is critical thickness of insulation **04**
(c) Explain Fourier's law of heat conduction. **07**
- Q.5** (a) Define (i) Absorptivity (ii) Transmissivity (iii) Reflectivity **03**
(b) Differentiate between free convection and forced convection. **04**
(c) Elaborate thermal and hydrodynamic boundary layer with diagram **07**
- OR**
- Q.5** (a) Give physical significance of Grashoff Number. **03**
(b) What is black body and grey body? **04**
(c) Give the statement of kirchhof's law and deduce the expression. **07**
