

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2019****Subject Code: 2153507****Date: 20/06/2019****Subject Name: Elements of Fluid Flow****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.

- Q.1** (a) Define Froude number and explain different flows based on this number. **03**
 (b) Derive an expression for pressure-density-height relationship. **04**
 (c) Explain in detail the nature of turbulence. **07**
- Q.2** (a) Write the range of Reynolds number for laminar, transition and turbulent flow. **03**
 (b) Write a note on boundary layer. **04**
 (c) Explain Rayleigh method with an example for dimensional analysis. **07**
- OR**
- (c) Explain Buckingham Pi theorem with an example for dimensional analysis. **07**
- Q.3** (a) What is dimensional analysis? **03**
 (b) Determine Reynolds number and type of flow for polymer melt with a density of 900 kg/m³ and viscosity of 1Pa-s flowing at 0.2 m/s in a 20 mm tube **04**
 (c) Derive Reynold's Analogy. **07**
- OR**
- Q.3** (a) What are weirs? State the different types of weirs. **03**
 (b) What are sonic, subsonic and supersonic flows? At which dimensionless number they are dependent explain in detail. **04**
 (c) Explain Newtonian and Non-Newtonian fluids with their corresponding stress strain curves and examples. **07**
- Q.4** (a) Find the kinematic viscosity of an oil having density 981 kg/m³. The shear stress at a point in oil is 0.2452 N/m² and velocity gradient at that point is 0.2 per second. **03**
 (b) What are pressure transducers? **04**
 (c) Explain at least five different types of flows. **07**
- OR**
- Q.4** (a) What is Newton's law of viscosity? **03**
 (b) Explain similarity laws in brief. **04**
 (c) Derive equation of motion. **07**
- Q.5** (a) Classify various flow meters. **03**
 (b) Write difference between venturi meter and orifice meter. **04**
 (c) A "U"-tube manometer containing mercury of density 13600 kg/m³ is used to measure the pressure drop along a horizontal pipe. If the fluid in the pipe has a specific gravity of 0.8 and the manometer reading is 0.6m, what is the pressure difference measured by the manometer? **07**
- OR**
- Q.5** (a) What is Rheology? **03**
 (b) Explain in detail about Magnus effect **04**
 (c) Explain principle and working of Rotameter with diagram. **07**
