

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2021****Subject Code:3153515****Date:15/12/2021****Subject Name:Elements of Fluid Mechanics****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**

- |            |   |           |
|------------|---|-----------|
| <b>Q.1</b> | (a) Mention any three properties of fluids with their relevant units.   | <b>03</b> |
|            | (b) Discuss various pressure measurement scales.  | <b>04</b> |
|            | (c) A plate of 0.025mm distant from a fixed plate moves at 60 cm/s require a force of 2 N/m <sup>2</sup> to maintain this speed. Determine the fluid viscosity between the plates.  | <b>07</b> |
| <b>Q.2</b> | (a) Discuss the classification of fluids based on stress – strain graphs  | <b>03</b> |
|            | (b) The pressure intensity at a point in a fluid is 3.924 N/cm <sup>2</sup> . Find the corresponding height when the fluid used is (a) water (b) oil of specific gravity 0.9  | <b>04</b> |
|            | (c) Explain how differential manometer is used for measuring pressure difference across a pipe.   | <b>07</b> |
|            | <b>OR</b>   |           |
|            | (c) Discuss the case of boundary layer formation when a fluid flows over a flat plate.  | <b>07</b> |
| <b>Q.3</b> | (a) Detail Skin friction and form friction losses for flow of fluid through a pipe.   | <b>03</b> |
|            | (b) Differentiate (a) Laminar and turbulent flow (b) Compressible and Incompressible flow   | <b>04</b> |
|            | (c) Derive the equation of discharge for flow of fluid through a Venturimeter.  | <b>07</b> |
|            | <b>OR</b>   |           |
| <b>Q.3</b> | (a) The diameters of a pipe at sections 1 and 2 are 10 cm and 15 cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5 m/s. Determine the velocity at section 2. | <b>03</b> |
|            | (b) Discuss the hydraulic coefficients of an orifice?   | <b>04</b> |
|            | (c) With a neat diagram discuss the various heads in a Pump.  | <b>07</b> |
| <b>Q.4</b> | (a) Define drag. Discuss the various drag effects encountered when fluid flows past a solid object.   | <b>03</b> |
|            | (b) What is Cavitation? Mention the disadvantageous effects when cavitation develops in a pipe.   | <b>04</b> |
|            | (c) Derive the expression for velocity distribution for the laminar flow of an incompressible fluid through a pipe?   | <b>07</b> |
|            | <b>OR</b>   |           |
| <b>Q.4</b> | (a) What is Stokes law? With a figure mention the forces acting on a spherical particle when it settles down in a fluid.  | <b>03</b> |
|            | (b) With a neat diagram explain the working principle of a rotameter.   | <b>04</b> |
|            | (c) Discuss the various cases of form frictional losses for the flow of fluid through a pipe  | <b>07</b> |

- Q.5** (a) Write a short note on flow pattern in agitated vessels. **03**  
(b) What are various types of impellers used in industries? **04**  
(c) Discuss the various applications of Fluidization. **07**

**OR**

- Q.5** (a) Mention the significance of Stagnation point and stagnation pressure **03**  
(b) What is swirling and how it can be prevented? **04**  
(c) What is fluidization and minimum fluidization velocity? Derive an expression for minimum fluidization velocity for flow of fluid through a packed bed. **07**

\*\*\*\*\*