

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III(OLD) EXAMINATION – SUMMER 2019

Subject Code: 130602

Date: 04/06/2019

Subject Name: 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.

- Q.1** (a) State and prove Pascal's law. **07**
(b) Describe different types of fluids. **07**
- Q.2** (a) What is manometer? Describe a differential manometer with sketch? **07**
(b) The pressure intensity at a point in a fluid is given 5 N/cm^2 . Find the corresponding height of fluid when fluid is (i) water (ii) oil of sp. Gravity=0.80 and (iii) kerosene of sp. Gravity = 0.74 **07**
- OR**
- (b) Determine the dynamic viscosity of oil used for lubrication between a square plate $0.9\text{m} \times 0.9\text{m}$ and an inclined plane inclined at 30° . The weight of square plate is 400 N and it slide down the inclined plane with a uniform velocity of 0.4 m/sec. Thickness of oil film is 1.5 mm. **07**
- Q.3** (a) Derive an expression for the total pressure and position of centre of pressure on a plane surface immersed vertically in a liquid. **07**
(b) Explain how you will determine the meta-centre height of a floating body experimentally? Explain with neat sketch. **07**
- OR**
- Q.3** (a) State the Bernoulli's equation and obtain Bernoulli's equation from Euler's equation of motion. **07**
(b) A circular plate of 2.5 m diameter is immersed in water in such a way that its greatest and least depth below free surface is 3.5 m and 1.5 m respectively. Determine the total pressure on one face of the plate and position of the center of pressure. **07**
- Q.4** (a) What is venturimeter? Derive an expression for discharge through a venturimeter. **07**
(b) Define the equation of continuity. Obtain an expression for continuity. **07**
- OR**
- Q.4** (a) Define force of buoyancy and meta-centre. Discuss the conditions of equilibrium for floating and sub-merged bodies with neat sketches. **07**
(b) Classify different types of orifices and write down the equations for hydraulic coefficients used in it. **07**
- Q.5** (a) Give classification of notches and weirs. Derive equation for the flow over a triangular notch. **07**
(b) The stream function for a two -dimensional flow is given by $\Psi=2xy$, calculate the velocity at the point P (2, 3). Find the velocity potential function ϕ . **07**

OR

- Q.5 (a)** Water is flowing from a tapered pipe having diameters 350mm and 200mm at section 1 and 2 respectively. The flow rate through the pipe is $0.05\text{m}^3/\text{sec}$. The section 1 is 10m above the datum and section 2 is 5m above the datum. If intensity of pressure at section 1 is 0.5MPa, find intensity of pressure of section 2. **07**
- (b)** Obtain the general energy equation for compressible flow. **07**
