Total number of printed pages: **02** **UG/3rd/UCE302**

2023

Fluid Mechanics

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **ALL** questions.*

1. Write a short notes on the following (*draw the figure, if necessary*) 5*5 = 25
   a) Surface tension
   b) Bhingham plastic
   c) Velocity Potential
   d) Flow through syphon
   e) Equivalent pipe

2. The rate of flow of water through a horizontal pipe is 0.25 m^3/s. The diameter of pipe which is 200 mm is suddenly enlarged to 400 mm. The pressure intensity in the smaller pipe is 11.772 N/cm^2. Then determine: 15
   i. Loss of head due to sudden enlargement.
   ii. Pressure intensity in the large pipe
   iii. Power required lost due to enlargement.

3. An orificemeter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure difference measured by a mercury-oil differential manometer on the two sides of the orificemeter gives a reading of 50 cm of mercury. Find the rate of flow of oil specific gravity 0.9 when the coefficient of discharge of the orificemeter is 0.64. 10

4. Derive the governing equation of continuity equation. 10

5. What do you mean by metacenter? Write in details about stability of submerged body. Draw the figures if necessary. 15

6. A plate having an area of 0.6 m^2 is sliding down the inclined plane at 30^0 to the horizontal with a velocity of 0.36 m/s. There is a cushion of fluid 1.8 mm thick between the plane and the plate. Find the viscosity of the fluid if the weight of the plate is 280 N. 15

7. Prove that velocity function exist only for irrotational flow. 10