Roll No ....

AU/ME-4002 (CBGS)

B.E. IV Semester

Examination, November 2019

Choice Based Grading System (CBGS)

Fluid Mechanics

Time : Three Hours

Maximum Marks : 70

Note: i)   Attempt any five questions.

  ii)   All questions carry equal marks.

  iii)   Sketch neat diagram.

1. a)   Define the following terms   7
   i)   Absolute pressure
   ii)   Gauge pressure
   iii)   Vacuum pressure

   b)   What is Meta centre? Discuss the stability of floating body.   7

2. a)   An oil film of thickness 115mm is used for lubricating between a square plate of size 0.8m×0.8m and an inclined plane having inclination of 30° with the horizontal. The weight of the square plate is 300 N and slides down the plane with a uniform velocity of 0.3m/sec. Find the dynamic viscosity of oil.   7

   b)   The velocity potential for 0 is given by

   $$0 = \frac{-xy^3}{3} - x^2 + \frac{x^3 y}{3} + y^2$$

   Calculate the velocity components in the X and Y direction. Check the possibility of such a flow.   7

PTO

3. a)   A pipe of diameter 400mm carries water at a velocity of 25m/s. The pressure at the point A and B are given as 29.43 N/cm^2 and 22.563 N/cm^2 respectively, while the datum head at A and B are 28 m and 30 m. Find the loss of head between A and B.   7

   b)   Derive an expression for Darcy-Weisbach equation.   7

4. a)   A 0.2 m diameter pipe carries liquid in laminar region A pitot tube placed in the flow at a radial distance of 15 mm from the axis of the pipe indicates velocity of 0.5 m/s. Calculate: 7
   i)   The maximum velocity
   ii)   The mean velocity
   iii)   The discharge in the pipe

   b)   Write a short note on   7
   i)   Major energy loss
   ii)   Minor energy loss
   iii)   Loss of head due to sudden enlargement
   iv)   Total energy line

5. a)   Explain Laminar boundary layer and Turbulent boundary layer.   7

   b)   Derive an expression for displacement, momentum and energy thicknesses.   7

6. a)   Explain: 7
   i)   Surface tension
   ii)   Compressibility
   iii)   Vapour pressure

b) Explain in detail   7
   i) Drag and Lift coefficients
   ii) Equipotential line
   iii) Rotational and irrotational flow

7. a) Derive an expression for total pressure and position of center of pressure for an inclined plane surface immersed in liquid.   7

   b) Explain the Buckingham-pi method of dimensional analysis with suitable example.   7

8. Write short notes on   14
   a) Non-Newtonian fluid
   b) Function of Pitot-Tube
   c) Dynamic similarity
   d) Stream function

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