

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 ϕ is given by

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

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

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/cm² and 22.563 N/cm² 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
