

Code: CE3T6

II B.Tech - I Semester–Regular/Supplementary Examinations
November 2018

FLUID MECHANICS
(CIVIL ENGINEERING)

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

- a) State Pascal's hydrostatic law.
- b) What is the difference between gauge pressure and absolute pressure?
- c) What are advantages of inverted differential manometer?
- d) What is the difference between stream line and path line?
- e) What is impulse? State the principle of impulse – momentum equation.
- f) What is meant by laminar boundary layer thickness?
- g) What is use of Moody's Chart?
- h) Differentiate between uniform and steady flows.
- i) State the conditions to be fulfilled for pipes in series and pipes in parallel.
- j) What is principle of Pitot tube?
- k) What is difference between weir and notch?

PART – B

Answer any **THREE** questions. All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2. a) List out the different types of Manometers. Explain the working principle of Micromanometer with neat sketch.

8 M

b) A plate having an area of 200mm x 300 mm is sliding down the inclined plane at 30° to the horizontal with velocity of 0.36 m/s. There is a cushion of fluid 1.8 mm thick between the plate and the plane. Find the viscosity of the fluid, if the weight of plate is 280 N.

8 M

3. a) Derive an expression for the depth of center of pressure from free surface of liquid of a inclined plane surface submerged in the liquid.

8 M

b) Find the total pressure and position of center of pressure on a triangular plate of base 2.4m and height 3.6m which is immersed in water in such away that the plan of the plate makes an angle of 60° with the free surface of the water. The base of the plate is parallel to water surface of the water. The base of the plate is parallel to water surface and is at a depth of 3 m from water surface.

8 M

4. a) Derive the Bernoulli's equation. State its limitations. 8 M
- b) A plate of length 750 mm and width 250 mm has been placed longitudinally in a stream of crude oil which flows with a velocity of 5 m/s. If all oil has a specific gravity of 0.8 and Kinematic viscosity of 1 stoke. Calculate: 8 M
- (i) Boundary layer thickness at the middle of plate
 - (ii) shear stress at the middle of plate and
 - (iii) Friction drag on one side of the plate.
5. a) List the major causes for energy loss. Explain how do you calculate each energy loss? 8 M
- b) A lubricating oil of viscosity 1 poise and specific gravity 0.9 is pumped through a 30 mm diameter pipe. If the pressure drop per meter length of pipe is 20 KN/m^2 , determine (i) The mass flow rate in kg/min (ii) The shear stress at the pipe wall (iii) The Reynolds number of flow and (iv) The power required per 50 m meter length of pipe. 8 M
6. a) What is Venturimeter? Derive the equation for discharge flow through venturimeter. 8 M
- b) A discharge of $0.06 \text{ m}^3/\text{s}$ was measured over a right angle notch. While measuring the head over the notch, an error of 1.5 mm was made. Determine the percentage error in the discharge if the co-efficient of discharge for the notch is 0.6. 8 M