



10CT63

Sixth Semester B.E. Degree Examination, Aug./Sept.2020
Fluid Mechanics and Hydraulics Structures

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO full questions from each part.

PART - A

- 1 a. Define the following: i) Density ii) Specific gravity iii) Specific volume
iv) Kinematic viscosity v) Mass density. (05 Marks)
- b. Define surface tension explain surface tension on liquid droplet. (06 Marks)
- c. The dynamic viscosity of an oil, used for lubrication between a shaft and sleeve is 6 poise the shaft is of diameter 0.4m and rotates at 190rpm. Calculate the power lost in the bearing for a sleeve length of 90mm. The thickness of the oil film is 1.5mm. (09 Marks)
- 2 a. Define pressure and Pascal law. (04 Marks)
- b. Derive the expression for differential manometer. (06 Marks)
- c. Derive the expression plane surface submerged in vertically immersed in liquid. (10 Marks)
- 3 a. Derive the Bemoulli's equation form Euler's equation of motion. (10 Marks)
- b. Derive the Darcy- Weisbach equation for head loss due to friction in a pipe. (10 Marks)
- 4 a. Derive the expression for venturimeter. (08 Marks)
- b. Derive the expression for Rectangular notch. (06 Marks)
- c. A right angled V-notch is used for measuring a discharge of 30lit/s. An error of 1.5mm was made while measuring the head over the notch calculate the % of error in discharge $c_d = 0.62$. (06 Marks)

PART - B

- 5 a. Explain concept of velocity triangles with workdone and efficiency. (12 Marks)
- b. A 7.5cm diameter jet having a velocity of 30m/s strikes a flat plate, the normal of which is inclined at 45° to the axes of the jet. Find the normal pressure on the plate.
 - i) When the plate is stationary.
 - ii) When the plate is moving with velocity 15m/s away from jet. Determine power and efficiency when moving. (08 Marks)
- 6 a. Explain Pelton wheel, theory and its parts. (10 Marks)
- b. Comparison between Kaplan turbine and Fransis turbine. (10 Marks)
- 7 a. Derive the expression for Chezy's and Manning's formulae. (08 Marks)
- b. Explain the most economical rectangular section channel and derive the same. (08 Marks)
- c. Determine the maximum discharge of water through a circular channel of diameter 1.5m when the bed slope of the channel is 1 in 1000 take $C = 60$. (04 Marks)
- 8 a. Derive the expression for maximum speed for starting a centrifugal pump. (10 Marks)
- b. The internal and external diameter of the Impeller of a centrifugal pump are 200mm and 400mm respectively. The pump is running at 1200rpm. The vane angles of the impeller at inlet and outlet 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the workdone by the impeller per unit weight of water. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, $42+8=50$, will be treated as malpractice.