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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular Examinations Feb-2021

FLUID MECHANICS & HYDRAULIC MACHINERY

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 a Calculate the density, specific weight and weight of one litre of petrol of specific gravity is 0.8. 6M
- b The surface tension of water in contact with air at 20° C is 0.082 N/m. The pressure inside of water droplet of water is to be 0.03 N/cm² greater than the outside pressure. Calculate the diameter of the droplet of water. 6M

OR

- 2 a Define surface tension. Derive the expression for surface tension on liquid droplet. 6M
- b Calculate the capillary raise in a glass tube of 2 mm diameter when immersed vertically water & mercury. Take surface tension is 0.0725 N/m for water and 0.52 N/m for mercury. The specific gravity of mercury is given 13.6 and angle of contact is 130°. 6M

UNIT-II

- 3 Explain different types of flow in detail. 12M

OR

- 4 a Define momentum equation and impulse momentum equation. 6M
- b Water is flowing through a pipe has diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm² and the pressure at the upper end is 9.81 N/cm². Determine the difference in datum head if the rate of flow through pipe is 40 lit/s. 6M

UNIT-III

- 5 Explain about Venturimeter with neat sketches. Derive expression for rate of flow through Venturimeter. 12M

OR

- 6 Derive the expression for head loss in pipes due to friction by using Darcy-Weisbach equation. 12M

UNIT-IV

- 7 a Derive the expression for force and the efficiency by the jet when it strikes at the centre of moving curved plate? 6M
- b A 8 cm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at 45° to the axis of the jet. Find the normal pressure on the plate when (i) the plate is stationary, and (ii) when the plate is moving with a velocity of 16 m/s and away from the jet. 6M

OR

- 8 A jet of water having a velocity of 45 m/s strikes a curved vane, which is moving with a velocity of 25 m/s. The jet makes an angle of 35° with the direction of motion of vane at inlet and leaves at an angle of 90° to the direction of the motion of the vane at outlet. Draw the velocity triangles at inlet and outlet and determine the vane angles at inlet and outlet so that the water enters and leaves the vane without shock. 12M

UNIT-V

9 What are the working principle and design specifications of a Kaplan turbine? Explain. **12M**

OR

10 a What is priming process? **4M**

b The internal and external diameters of the impeller of a centrifugal pump are 200 mm and 400 mm respectively. The pump is running at 1200 rpm. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water. **8M**

***** END *****

UNIT-VI

OR

UNIT-VII

OR

UNIT-VIII

OR