

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

B.Tech II Year II Semester Regular & Supplementary Examinations August-2023

FLUID MECHANICS & HYDRAULIC MACHINERY

(Agricultural Engineering)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a Define and mention units for the following fluid properties: Density, specific weight, specific volume and specific gravity of a fluid. **CO1 L1 8M**
- b Calculate the density, specific weight and weight of one liter of petrol of specific gravity is 0.7. **CO1 L3 4M**

OR

- 2 a State Pascal's law. What do you understand the terms Absolute, Gauge & vacuum pressure? **CO1 L1 6M**
- b What is the gauge pressure at a point 3m below the free surface of a liquid having a density $1.53 \times 10^3 \text{ kg/m}^3$, if the atmospheric pressure is equivalent to 750 mm of mercury. The Specific gravity of mercury is 13.6 and density of water is 1000 kg/m^3 . **CO1 L3 6M**

UNIT-II

- 3 Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries one third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE. **CO2 L4 12M**

OR

- 4 A 300 mm diameter pipe carries water under a head of 20 m with a velocity of 3.5 m/s. If the axis of the pipe turns through 45° , find the magnitude and direction of the resultant force at the bend. **CO2 L4 12M**

UNIT-III

- 5 Explain about orifice meter and Derive expression for rate of flow through orifice meter. **CO3 L2 12M**

OR

- 6 Derive the expression for head loss in pipes due to sudden contraction. **CO3 L2 12M**

UNIT-IV

- 7 a Derive an expression for the force exerted by a jet of water on an inclined flat plate in the direction of the jet. **CO4 L2 6M**
- b A jet of water of diameter 50 mm moving with a velocity of 40 m/s, strikes a curved fixed symmetrical plate at the centre. Find the force extracted by jet of water in the direction of the jet, if the jet is deflected through an angle of 120° at the outlet of the curved plate. **CO4 L4 6M**

OR

- 8 A jet of water moving at 12 m/s impinges on vane shaped to deflect the jet through 120° when stationary. If the vane is moving at 5 m/s, find the angle of the jet so that there is no shock at inlet. What is the absolute velocity of the jet at exit in magnitude and direction and the work done per second per unit weight of water striking per second. Assume that the vane is smooth. **CO4 L4 12M**

UNIT-V

- 9 Explain what are the component parts of Kaplan turbines with neat sketch. **CO5 L2 12M**

OR

- 10 a A centrifugal pump delivers water against a net head of 14.5m and a design speed of 1000 r.p.m. The vanes of curved back to an angle of 30° with the periphery. The impeller diameter is 300mm and outlet width is 50mm. Determine the discharge of the pump if manometric efficiency is 95%. **CO5 L3 7M**
- b Explain pumps in series and parallel. **CO5 L2 5M**

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