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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)**B. Tech II Year I Semester Supplementary Examinations November-2022**
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 State Pascal's law. What do you understand the terms Gauge & Vacuum pressure? **L1 6M**
 b What is the gauge pressure at a point 3m below the free surface of a liquid having **L4 6M**
 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 = 1000 kg/m^3 ?

OR

- 2 a Explain the terms of compressibility and bulk modulus. **L1 6M**
 b Obtain an expression for capillary rise of a liquid. **L3 6M**

UNIT-II

- 3 a Define the terms: Stream line, streak line and path line. **L1 6M**
 b Define rate of flow and derive continuity equation for one dimensional flow. **L3 6M**

OR

- 4 a Explain Energy gradient line and Hydraulic gradient line. **L1 4M**
 b The water is flowing through a pipe having diameter 20cm and 10cm at section 1 **L4 8M**
 and 2 respectively. The rate of flow through pipe is 35 L/s. The section 1 is 6 m above the datum and section 2 is 4 m above datum. If the pressure at section 1 is 39.24 N/cm^2 , Find the intensity of pressure at section 2.

UNIT-III

- 5 a Explain Pitot tube and Pitot static tube. **L1 6M**
 b A sub-marine move horizontally on a sea and has its axis 15m below the surface **L4 6M**
 of water. A pitot tube properly placed just in front of a sub-marine and along its axis is connected to two limbs of a U – tube containing mercury. The difference of mercury level is found to be 170mm. Find the speed of the submarine knowing that the specific gravity of mercury is 13.6 and that of sea water is 1.026 with respect of fresh water.

OR

- 6 Explain about orifice meter with neat sketches. Derive expression for rate of flow **L1 12M**
 through orifice meter.

UNIT-IV

- 7 a Derive the expression for force and the efficiency by the jet when it strikes at the **L4 6M**
 centre of moving curved plate.
 b A 7.5 cm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of **L4 6M**
 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 15 m/s and away from the jet.

OR

- 8 a Derive an expression for the force exerted by a jet of water on an inclined fixed plate in the direction of the jet. **L3 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 center. 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. **L4 6M**

UNIT-V

- 9 Explain Definitions of Heads and Efficiencies of a centrifugal pump. **L1 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%. **L4 7M**
- b Explain pumps in series and parallel. **L1 5M**

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