Q.P. Code: 19CE0151

Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY .: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations August-2021 FLUID MECHANICS & HYDRAULICS MACHINERY

(Mechanical Engineering)

Time: 3 hours

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4

(Answer all Five Units $5 \times 12 = 60$ Marks)

UNIT-I

- Obtain an expression for capillary rise of a liquic a
 - What is the gauge pressure at a point 4m below the free surface of a liquid having b **6M** a density 1.43 x 10^3 kg/m³, 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

- Discuss the U- tube Manometer in detail and derive the expression for 2 a pressure measurement.
 - **b** A simple U-tube manometer containing mercury is connected to a pipe in which a **6M** fluid of specific gravity is 0.75 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 50cm and the height of fluid in the left from the center of pipe is 15cm below.

UNIT-II

Water flows through a pipe AB 1.25 m diameter at 3 m/s and then passes through a 3 **12M** 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.

OR

a Explain Energy gradient line and Hydraulic gradient line. **b** The water is flowing through a pipe having diameter 20cm and 10cm at section 1 **6**M and 2 respectively. The rate of flow through pipe is 35 liters/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/cm2, Find the intensity of pressure at section 2.

UNIT-III

An orifice meter with orifice diameter 14 cm is inserted in a pipe of 30cm diameter. 12M 5 The pressure difference measured by mercury oil in differential manometer on the two sides of the orifice meter gives a reading of 55 cm of mercury. Find the rate of flow of file of specific gravity 0.9 when the coefficient of discharge of the orifice meter is 0.64.

OR

A horizontal pipeline 45 m long is connected to a water tank at one end and discharges **12M** 6 freely into the atmosphere at other end. For the first 25 m of its length from the tank, the pipe is 120 mm diameter and its diameter is suddenly enlarged to 250 mm. the height of water level in the tank is 8 m above the centre of pipe. Considering all losses of head which occur, determine the rate of flow. Take f = 0.01 for both sections of the pipe.

6M

Max. Marks: 60

6M

6M

UNIT-IV

R19

6M

12M

6M

7 A jet of water of diameter 50mm moving with a velocity of 25 m/s impinges on a fixed 12M curved plate tangentially at one end at an angle of 30° to the horizontal. Calculate the resultant force of the jet on the plate if the jet is reflected through an angle of 50°. Take $g = 10 \text{ m/s}^2$

OR

- **8** a Explain the different types of hydroelectric power stations.
 - **b** Explain the factor to be considered for selection of site for hydroelectric power **6M** plant.

UNIT-V

9 Explain the Classifications and efficiencies of turbines in detail.

OR

- 10 a Explain pumps in series and parallel.
 - b A centrifugal pump delivers water against a net head of 14.5m and a design speed of 1200 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%.

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