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   Max. Marks: 60

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

UNIT-I

1 a Obtain an expression for capillary rise of a liquid   6M
   b What is the gauge pressure at a point 4m below the free surface of a liquid having   6M
      a density 1.43×10^3 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 Discuss the U- tube Manometer in detail and derive the expression for   6M
      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

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

4 a Explain Energy gradient line and Hydraulic gradient line.   6M
   b The water is flowing through a pipe having diameter 20cm and 10cm at section 1   6M
      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

5 An orifice meter with orifice diameter 14 cm is inserted in a pipe of 30cm diameter.   12M
   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

6 A horizontal pipeline 45 m long is connected to a water tank at one end and discharges   12M
   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.

UNIT-IV

7   A jet of water of diameter 50mm moving with a velocity of 25 m/s impinges on a fixed 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 $g = 10$ m/s^2 **12M**

OR

8   a   Explain the different types of hydroelectric power stations.   **6M**

    b   Explain the factor to be considered for selection of site for hydroelectric power plant.   **6M**

UNIT-V

9   Explain the Classifications and efficiencies of turbines in detail.   **12M**

OR

10   a   Explain pumps in series and parallel.   **6M**

    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%.   **6M**

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