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

B.Tech II Year II Semester Regular Examinations October-2022

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 surface tension? Derive the expression for surface tension on liquid droplet. **L2 6M**
 b Calculate the capillary rise in a glass tube of 2.5mm diameter when immersed **L3 6M**
 vertically in (i) water (ii) mercury. Take surface tension is 0.0725 N/m for water and 0.52 N/m for mercury in contact with air. The specific gravity of mercury is given as 13.6 and angle of contact is 130° .

OR

- 2 a Derive the expression for pressure measurement of U-Tube manometer with neat **L2 6M**
 sketches.
 b A simple U-tube manometer containing mercury is connected to a pipe in which a **L3 6M**
 fluid of specific gravity is 0.8 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 40cm and the height of fluid in
 the left from the center of pipe is 15cm below.

UNIT-II

- 3 Obtain an expression for continuity equation for three - dimensional flow with neat **L2 12M**
 sketch.

OR

- 4 Derive Bernoulli's equation and what are the assumptions of Bernoulli's equation. **L2 12M**

UNIT-III

- 5 a Explain pitot tube and pitot static tube. **L1 6M**
 b Find the head lost due to friction in a pipe of diameter 300 mm and length 50 **L3 6M**
 m, through which water is flowing at a velocity of 3 m/s using Darcy formula. Take ν
 for water is 0.01 stokes.

OR

- 6 Derive the expression for head loss in pipes due to friction by using Darcy- Weisbach **L2 12M**
 equation.

UNIT-IV

- 7 a Derive an expression for jet strikes the curved plate at one end tangentially when the **L2 6M**
 plate is symmetrical.
 b A nozzle of 50 mm diameter delivers a stream of water at 20 m/s perpendicular to a **L3 6M**
 plate that moves away from the jet at 5 m/s. Find (i) the force on the plate, (ii) the
 work done and (iii) the efficiency of jet.

OR

- 8 Explain the different types of hydroelectric power stations or power plants with neat **L2 12M**
 sketch.

UNIT-V

- 9 A Pelton wheel is to be designed for the following specifications: **L3 12M**
Shaft power = 11,772 kW, Head = 380 m, Speed = 750 r.p.m, Overall efficiency = 86%;
Jet diameter is not to exceed one-sixth of the wheel diameter. Determine: (i) The wheel diameter, (ii) The number of jets required and (iii) Diameter of jet. Take $K_v1 = 0.985$ and $K_u1 = 0.45$.

OR

- 10 a Write a short note on multistage centrifugal pump. **L1 6M**
b Write a short note on net positive suction head (NPSH). **L1 6M**

*** END ***