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

B.Tech II Year I Semester Regular Examinations May-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 Define surface tension. Derive the expression for surface tension on liquid droplet. L2 8M
 b The surface tension of water in contact with air at 20⁰ C is 0.072 N/m. The pressure inside of water droplet of water is to be 0.02 N/cm² greater than the outside pressure. Calculate the diameter of the droplet of water. L3 4M

OR

- 2 a Discuss the U- tube Manometer in detail and derive the expression for pressure measurement. L2 6M
 b A simple U-tube manometer containing mercury is connected to a pipe in which a 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. L3 6M

UNIT-II

- 3 a The diameters of a pipe at the sections 1 & 2 are 10 cm and 15 cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5 m/s. Determine also the velocity at section 2. L1 6M
 b Define the following terms: Velocity potential function, stream function and flow net. L1 6M

OR

- 4 a Derive equation for force exerted by the flowing fluid on a Pipe bend. L2 6M
 b Derive Euler's equation of motion. L2 6M

UNIT-III

- 5 List out minor losses in pipe flow and write the equations for all minor losses. L2 12M

OR

- 6 a Recall the concept of pipes in series and parallel. L1 6M
 b Find the head lost due to friction in a pipe of diameter 300 mm and length 50 m, through which water is flowing at a velocity of 3 m/s using Darcy formula. L4 6M

UNIT-IV

- 7 a Explain the different types of hydroelectric power stations. L2 6M
 b Explain the factor to be considered for selection of site for hydroelectric power plant. L2 6M

OR

- 8 a Derive an expression for the hydraulic efficiency when a liquid jet strikes a single fixed curved vane. L2 6M
 b A jet of 50 mm diameter delivers a stream of water at 20 m/s perpendicular to a plate that moves away from the jet 5 m/s. Find the force on the plate, work done and efficiency of jet. L4 6M

UNIT-V

- 9 a The internal and external diameters of the impeller of a centrifugal pump are 200 mm and 400 mm respectively. The pump is running at 1200 rpm. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water. **L3 8M**
- b What is priming process? **L1 4M**

OR

- 10 What is the working principle and design specification of a Kaplan turbine? Explain. **L4 12M**

***** END *****

UNIT-III

UNIT-III

UNIT-IV

UNIT-IV