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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations February-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	The surface tension of water in contact with air at 20^0 C is 0.072 N/m. The pressure inside of water droplet of water is to be 0.02 N/cm^2 greater than the outside Pressure. Calculate the diameter of the droplet of water.	L2	6M

OR

2	a	Derive the expression for pressure difference in differential manometers with neatsketches.	L2	10M
	b	Explain the terms of compressibility and bulk modulus.	L2	2M

UNIT-II

3	a	Define rate of flow and derive continuity equation for one dimensional flow.	L1	5M
	b	Derive force exerted by flowing fluid on a Pipe bend equation.	L3	7M

OR

4	a	Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is0.8 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.	L4	10M
	b	Explain different types of flow in detail.	L2	2M

UNIT-III

5		An orifice meter with orifice diameter 15 cm is inserted in a pipe of 30cm diameter. The pressure difference measured by mercury oil in differential manometer on the two sides of the orifice meter gives a reading of 50 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.	L4	12M

OR

6		A horizontal pipeline 40 m long is connected to a water tank at one end and discharges freely into the atmosphere at other end. For the first 25 m of its length from the tank, the pipe is 150 mm diameter and its diameter is suddenly enlarged to 300 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	L3	12M

UNIT-IV

7	a	A jet of water of diameter 50 mm moving with a velocity of 40 m/s, strikes a curved fixed symmetrical plate at the centre. 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 outletof the curved plate	L4	6M
	b	A 7.5 cm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of 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.	L4	6M

OR

8		A jet of water moving at 12 m/s impinges on vane shaped to deflect the jet through 120° when stationary. If the vane is moving at 5 m/s, find the angle of the jet so that there is no shock at inlet. What is the absolute velocity of the jet at exit in magnitude and direction and the work done per second per unit weight of water striking per second? Assume that the vane is smooth.	L4	12M

UNIT-V

9		A Pelton wheel is to be designed for the following specifications: 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 jetsrequired and (iii) Diameter of jet. Take Kv1 = 0.985 and K u1 = 0.45.	L1	12M

OR

10	a	Derive the expression for specific speed.	L1	6M
	b	What is priming process?	L1	6M

*** END ***