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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations December-2021

FLUID MECHANICS & HYDRAULIC MACHINERY

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

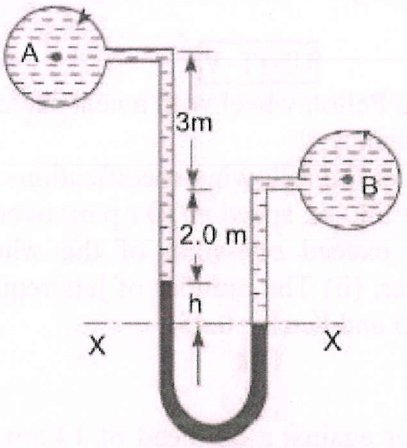
(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	Define and mention units for the following fluid properties: Density, specific weight, specific volume and specific gravity of a fluid.	L1	6M
	b	A plate 0.025mm at a distance from a fixed plate moves at 60 cm/sec and requires a force of 2 N/m2. Determine viscosity between the plates.	L2	6M

OR

2	a	State Pascal's law. What do you understand the terms Absolute, Gauge & vacuum pressure?	L1	6M
	b	A differential manometer is connected at two points A and B of two pipes as shown in the figure. The pipe A contains a liquid of specific gravity 1.5 while pipe B contains a liquid of specific gravity 0.9 pressure at A and B are 1 kgf/cm2 and 1.80 kgf/cm2respectively. Find the difference in Mercury level in a differential manometer.	L2	6M



UNIT-II

3	a	Define rate of flow and derive continuity equation for one dimensional flow.	L1	6M
	b	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 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.	L2	6M

OR

4	a	Derive Bernoulli's equation and state assumptions.	L1	6M
	b	Water is flowing through a pipe has diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm2 and the pressure at the upper end is 9.81 N/cm2. Determine the difference in datum head if the rate of flow through pipe is 40 lit/s.	L2	6M

UNIT-III

5	a	Explain about Venturimeter with neat sketches. Derive expression for rate of flow through Venturimeter.	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.	L2	6M

OR

6	a	Derive the expression for head loss in pipes due to friction by using Darcy-Weisbach equation.	L1	6M
	b	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.	L2	6M

UNIT-IV

7	a	Derive an expression for the force exerted by a jet of water on an inclined fixed plate in the direction of the jet.	L1	6M
	b	Explain the different types of hydroelectric power stations.	L2	6M

OR

8	a	Explain the various elements of hydroelectric power station with a neat sketch	L1	6M
	b	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 outlet of the curved plate.	L2	6M

UNIT-V

9	a	Explain the working principle of a Pelton wheel with a neat sketch and also derive equation for hydraulic efficiency.	L1	6M
	b	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 jets required and (iii) Diameter of jet. Take Kv1 = 0.985 and K u1 = 0.45.	L2	6M

OR

10	a	What is priming process?	L1	6M
	b	A centrifugal pump delivers water against a net head of 14.5m and a design speed of 1000 rpm. 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%.	L2	6M

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