SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year II Semester Regular & Supplementary Examinations June-2024
FLUID MECHANICS & HYDRAULIC MACHINERY
(Agricultural Engineerng)

Time: 3 Hours   **Max. Marks: 60**

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

UNIT-I

1	a	The surface tension of water in contact with air at 20^0 C is 0.0725 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.	CO1	L3	6M
	b	Calculate the capillary rise in a glass tube of 2.5mm diameter when immersed 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 130^0.	CO1	L3	6M

OR

2	a	Write a shot notes on Pascal's law, Absolute, Gauge & vacuum pressure.	CO1	L2	6M
	b	An inverted U – tube manometer is connected to two horizontal pipes A and B through which water is flowing. The vertical distance between the axes of these pipes is 30cm. When an oil of specific gravity 0.8 is used as a gauge fluid, the vertical heights of water columns in the two limbs of the inverted manometer (when measured from the respective center lines of the pipes) are found to be same and equal to 35 cm. Determine the difference of pressure between the pipes.	CO1	L3	6M

UNIT-II

3		Obtain an expression for continuity equation for three - dimensional flow with neat sketch.	CO2	L2	12M

OR

4		A 300 mm diameter pipe carries water under a head of 20 m with a velocity of 3.5 m/s. If the axis of the pipe turns through 45°, find the magnitude and direction of the resultant force at the bend.	CO2	L4	12M

UNIT-III

5	a	Write short notes on orifice meter.	CO3	L2	4M
	b	An orifice with diameter 15 cm is inserted in a pipe of 30cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50 cm of mercury. Find the rate of flow of oil of specific gravity 0.9 when the coefficient of discharge of the orifice meter is 0.64.	CO3	L4	8M

OR

6	a	Recall the concept of pipes in series and parallel.	CO3	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.Take v for water is 0.01stokes	CO3	L3	6M

UNIT-IV

7	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: (i) when the plate is stationary, and (ii) when the plate is moving with a velocity of 15 m/s and away from the jet. Also determine the power and efficiency of the jet when the plate is moving.	CO4	L3	12M

OR

8	Explain the different types of hydroelectric power stations or power plants with neat sketch.	CO4	L2	12M

UNIT-V

9	Explain the component parts of Kaplan turbines with neat sketch.	CO5	L2	12M

OR

10	A Francis turbine with an overall efficiency of 75% is required to produce 148.25kW power. It is working under a head of 7.62m.The peripheral velocity = $0.26 \sqrt{2gH}$ and the radial velocity of flow at inlet is $0.96 \sqrt{2gH}$. The wheel runs at 150 r.p.m.and the hydraulic losses in the turbine are 22% of the available energy. Assuming radial discharge, determine: (i) The guide blade angle, (ii) The wheel vane angles at inlet (iii) Diameters of the wheel at inlet, and (iv) Width of the wheel at inlet.	CO5	L3	12M

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