O.P.Code: 23CE0114	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year II Semester Regular Examinations July/August-2025

HYDRAULICS & HYDRAULIC MACHINERY

(Civil Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define boundary layer thickness.	CO1	L2	2M
	b	Define laminar flow and what is the value of Reynolds number.	CO1	L1	2M
	c	State the conditions for most economical trapezoidal section.	CO2	L1	2M
	d	Define prismatic channel.	CO2	L1	2M
	e	List the methods to dissipate the energy of flowing water.	CO3	L2	2M
	f	Define specific energy.	CO3	L1	2M
	g	State the principle behind impact of jet on vanes.	CO5	L1	2M
	h	What is the purpose of draft tube?	CO5	L1	2M
	i	Define cavitation.	CO6	L1	2M
	j	State the purpose of priming.	CO6	L1	2M

PART-B

(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2		Derive an expression for laminar flow through circular pipes.	CO1	L2	10M

OR

3	a	Explain Reynolds experiment with a neat sketch	CO1	L1	5M
	b	The viscosity of an oil of specific gravity 0.8 is measured by a capillary tube of diameter 40 mm. The difference of pressure head between two points 1.2 m apart is 0.3 m of water. The weight of oil collected in a measuring tank is 400 N in 100 seconds. Find the viscosity of oil.	CO1	L4	5M

UNIT-II

4	a	Classify various types of flow in channels and explain.	CO2	L2	5M
	b	A triangular gutter whose sides include an angle of 60 degrees conveys water at a uniform depth of 250 mm. If the discharge is 0.04 cumec, determine the gradient of the trough. Take C = 52.	CO2	L4	5M

OR

5	a	Derive an expression for velocity of flow through open channel using Chezy's equation.	CO2	L1	5M
	b	Determine the most economical section of rectangular channel carrying water at the rate of 0.5 cumec, the bed slope of the channel being 1 in 2000. Take C = 60.	CO2	L5	5M

UNIT-III

6	a	Derive the relationship between specific energy, critical depth and critical velocity.	CO3	L2	5M
	b	Water flows at a steady and uniform depth of 2 m in an open channel of rectangular cross section having base width equal to 5 m and laid at a slope of 1 in 1000. It is desired to obtain critical flow in the channel by providing a hump in the bed. Calculate the height of the hump. Consider the value of Manning's rugosity coefficient N = 0.02 for the channel surface.	CO3	L4	5M

OR

7		List various assumptions made in the analysis of hydraulic jump and establish the relationship for depth of jump before and after the hydraulic jump.	CO4	L2	10M

UNIT-IV

8	a	Derive an expression for force exerted on a stationary flat plate held inclined to the jet.	CO5	L2	5M
	b	A jet of water strikes with a velocity of 35 m/s a flat plate inclined at 30 degrees with the axis of the jet. If the cross sectional area of the jet is 25 sq cm, determine the force exerted by the jet on the plate, components of the force in the direction normal to the jet and ratio in which the discharge gets divided after striking the plate.	CO5	L4	5M

OR

9	a	Explain the classifications of turbines.	CO5	L1	5M
	b	Explain construction and working of Pelton Wheel with a neat sketch.	CO5	L2	5M

UNIT-V

10	a	Sketch and explain component parts of a centrifugal pump	CO6	L1	5M
	b	A centrifugal pump is to discharge 0.118 cumec at a speed of 1450 rpm against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller.	CO6	L4	5M

OR

11	a	List different types of heads of a centrifugal pump.	CO6	L1	5M
	b	Classify losses and efficiencies of a centrifugal pump.	CO6	L1	5M

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