

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(AUTONOMOUS)
II B.Tech II Semester Regular/Supplementary Examinations, May-2024
HYDRAULICS AND HYDRAULIC MACHINERY
(CE)

Time: 3 hours

Max. Marks: 70

Answer ONE Question from each Unit
All Questions Carry Equal Marks

Q. No.		Questions	BTL	CO	Marks
UNIT – I					
1.	a)	Derive an expression for discharge through a Trapezoidal channel by Chezy’s formula.	K3	CO1	7M
	b)	Find the discharge through a trapezoidal channel of width 8m and side slope of 1 horizontal to 3 vertical. The depth of flow of water is 2.4m and value of Chezy’s constant, C= 50. The slope of the bed channel is given 1 in 4000.	K3	CO1	7M
OR					
2.	a)	Explain briefly about specific energy curve.	K2	CO1	7M
	b)	Derive an expression for critical depth of rectangular channel.	K3	CO1	7M
UNIT – II					
3.	a)	What is kinematic similarity? What is its significance?	K1	CO2	7M
	b)	Define and explain Reynolds’s number, Froude’s number and Mach number. Derive expressions for any above two numbers.	K2	C02	7M
OR					
4.	a)	State Reyleigh’s theorem and discuss its applications.	K3	CO2	7M
	b)	What are the uses of Buckingham pi theorem	K2	CO2	7M
UNIT – III					
5.	a)	Derive an expression for force exerted by a jet on moving symmetric curved plate when jet is striking at the Centre.	K3	CO3	7M
	b)	A jet of water of diameter 50mm moving with a velocity of 40m/s, strikes a curved fixed plate at the Centre. Find the force exerted by the jet of water in the direction of the jet, if jet is deflected through an angle of 120 ⁰ at the outlet of the curved plate.	K3	CO3	7M
OR					

6.	A 60 mm diameter jet having a velocity of 30 m/s, strikes a flat plate, the normal of which is inclined at 30° to the axis of the jet. Calculate the normal force exerted on the plate a) when the plate is stationary, b) when the plate is moving with a velocity of 10 m/s in the direction of the jet, c) work done and efficiency when the plate is moving.		K4	CO3	14M
UNIT – IV					
7.	A pelton wheel has a mean bucket speed of 15 m/s with a jet of water flowing at the rate of 700 litres/sec under a head of 50 metres. The buckets deflect the jet through an angle of 160°. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume co-efficient of velocity as 0.98.		K4	CO4	14M
OR					
8.	a)	A Francis turbine works under a head of 8.5 m at a speed of 300 rpm. A power of 100 KW is developed with a discharge of 3 m ³ /sec; the runner diameter is 2.2 m. Find the speed, discharge and power if the head is increased to 18m.	K3	CO4	7M
	b)	Write the functions of Draft tube. List out different types of Draft tubes and explain any one	K2	CO4	7M
UNIT – V					
9.	a)	Draw the neat diagram of the Reciprocating pump and mention the main components of the pump	K2	CO5	7M
	b)	Derive the expression for work done by the single acting reciprocating pump	K3	CO5	7M
OR					
10.	a)	Briefly explain about cavitation of centrifugal pump and NPSH .	K2	CO5	7M
	b)	A centrifugal pump delivers 100 lts/sec of fuel oil against a pressure of 1.5 kg/cm ² of specific gravity 0.80. The outer and inner dia. Of impeller are 40 cm and 22.5 cm respectively. The speed is 1200 rpm. The blade area coefficient is 0.9 at inlet and outlet respectively. Manometric efficiency is 75%. Calculate :a) Theoretical power required to drive the pump, b) Vane angle at inlet and outlet, c) Te diffuser blade angle at its inlet edge.	K3	CO5	7M