R22 Regulation *Subject code: 4E4AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech IV Semester Regular/Supplementary Examinations, June 2026

HYDRAULICS & HYDRAULIC MACHINERY

(CE)

Maximum Marks: 60 Date:15.06.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1a)	State the Manning's formula and Bazin formula	1M	1	L1
b)	What is most economical section?	1M	1	L1
c)	What is meant by dimensional analysis?	1M	2	L1
d)	List the limitations of model	1M	2	L1
e)	Define the term jet efficiency.	1M	3	L1
f)	What is the condition for maximum force on a stationary plate?	1M	3	L1
g)	Write two important functions of draft tube	1M	4	L3
h)	What is hydraulic turbine?	1M	4	L1
i)	Distinguish between suction head and delivery head	1M	5	L2
j)	What are different losses in a centrifugal pump:	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Derive Chezy's formula. b) Determine the most economical section of rectangular channel carrying water at the rate of 0.6 cumecs. The bed slope of the channel is 1 in 2000. Assume Chezy's constant C=50.	5M 5M	1 1	L4 L3
	OR			
3	a) A horizontal rectangular channel 4 m wide carries a discharge of 16 m^3/s..Determine whether a jump may occur at an initial depth of 0.5 m or not. If a jump occurs, determine the sequent depth to this initial depth. Also determine the energy loss in the jump. b) Find the slope of the free water surface in a rectangular channel of width 20 m, having depth of flow 5 m. The discharge through the channel is 52 cumecs. The bed slope of the channel is 1 in 4000. Assume Chezy's constant C as 60.	5M 5M	1 1	L3 L3
4	a) Analyze the procedure for solving the problems by Buckingham's π theorem. b) Define and derive different dimensionless numbers involved in Fluid mechanics	5M 5M	2	L4 L4

	OR			
5	a) Explain geometric, kinematic, and dynamic similarity with examples. b) What are distorted and undistorted (non-distorted) models? Explain with examples.	5M 5M	2	L2 L2
6	a) A jet of water of diameter 50 mm moving with a velocity of 20 m/s strikes a fixed plate in such a way that the angle between the jet and the plate is 60°. Find the force exerted by the jet on the plate (i) in the direction normal to the plate (ii) in the direction of the jet b) Derive the expression for force exerted by a jet on a moving flat plate in the direction of the jet.	5M 5M	3	L3 L4
	OR			
7	a)A jet of water of diameter 50 mm strikes a fixed plate in such a way that the angle between the plate and the jet is 30^0. The force exerted in the direction of the jet is 147.1 N. Determine the rate of flow of water. b) Draw and explain the velocity triangles at inlet and outlet for: (a) stationary curved vane (b) moving curved vane.	5M 5M	3	L3 L3
8	a) Derive the relationship between different efficiencies. b) Explain the construction and working of a Pelton wheel with a neat sketch.	5M 5M	4	L4 L2
	OR			
9	a) A conical draft tube having diameter at the top as 2.0 m and pressure head at 7 m of water (Vaccum), discharges water at the outlet with a velocity of 1.2 m/s at the rate of 25 m^3/s. If atmospheric pressure head is 10.3 m of water and losses between the inlet and outlet of the draft tubes are negligible, find the length of draft tube immersed in water. Total length of the tube is 5m. b) What is governing of turbines? Why is it necessary?	5M 5M	4	L3 L3
10	a) A Centrifugal pump is running at 800rpm. The outlet vane angle of the impeller is 350 and velocity of flow at outlet is 3.5m/s. The discharge through the pump is 200lits/s when the pump is working against the head of 25m. If Manometric efficiency of the pump is 80% determine the i) Diameter of the impeller and ii) Width of the impeller at the outlet b) Draw the neat sketch of multistage Centrifugal pumps and explain their applications	5M 5M	5	L3 L3
	OR			
11	a) Draw and explain the installation of a centrifugal pump with neat sketch. b) Explain why a centrifugal pump must be primed before starting.	5M 5M	5	L3 L2