B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023

Fourth Semester

Civil Engineering

20CEPC401 - APPLIED HYDRAULIC ENGINEERING

(Regulations 2020)

Duration: 3 Hours   Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Tell about the open channel.	2,K1,CO1
2.	Show the velocity distribution diagram in trapezoidal channel.	2,K2,CO1
3.	List out the classification of surface profiles.	2,K1,CO2
4.	Recall the term draw down curve.	2,K1,CO2
5.	Distinguish between GVF and RVF.	2,K2,CO3
6.	State the term surges.	2,K1,CO3
7.	Write down the equation for head loss when hydraulic jump occurs.	2,K2,CO4
8.	Define the length of hydraulic jump.	2,K1,CO4
9.	Distinguish between Impulse and Reaction turbines.	2,K2,CO5
10.	Define cavitation in turbines.	2,K1,CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	(i) Distinguish between open channel flow and pipe flow.	5,K2,CO1
		(ii) Classify the different types of flow.	8,K2,CO1

OR

	b)	Find the velocity of flow and rate of flow of water through a rectangular channel of 5m wide 2m deep, when it is running full. The channel is having bed slope of 1 in 3000. Take Chezy's constant. C = 50.	13,K3,CO1

12.	a)	Calculate the most economical section of a rectangular channel carrying water of the rate of 0.5 m³/sec, the bed slope of the channels being 1 in 2000. Take Chezy's constant C = 50.	13,K3,CO2

OR

	b)	In a rectangular channel of width 24 m and depth of flow 6 m, the rate of flow of water is 86.4 m³/sec. If the bed slope of channel is 1 in 4000. Identify the slope of the free water surface. Take chezy's constant C = 60.	13,K3,CO2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **11992**

13. a) Illustrate the Water surface profile with neat sketches.   *13,K2,CO3*

OR

b) Calculate length of back water curve in a channel that conveys water. The depth of flow at end of control volume is 0.4m and velocity of water is 1 m/s. The depth of flow of the beginning of control volume is 0.2m and velocity of flow is 1.2 m/s. Take i = 1 in 2000. i $_e$= 0.00004.   *13,K3,CO3*

14. a) (i) A hydraulic jump occurs in a rectangular channel and the depths of flow before and after the jump are 0.45 m and 1.8 m respectively. Compute the critical depth of flow.   *8,K3,CO4*

    (ii) Illustrate the different types of hydraulic jump.   *5,K2,CO4*

OR

b) Check whether hydraulic jump occurs (or) not in the following case. B = 2.5m; Q = 1.7 m^3/s; d = 0.3m, if occurs, calculate   *13,K2,CO4*

    1. Depth of hydraulic jump.
    2. Energy loss.

15. a) A pelton wheel is to be designed for the following specification: Shaft power = 11,772 kw ; Head = 380 meters; Speed = 750 r.p.m; Overall efficiency = 86 % ; jet diameter is not exceed one – sixth of the wheel diameter. Calculate; (i)The wheel diameter, (ii)The number of jets required and Diameter of the jet. Take C_v = 0.985 and speed ratio = 0.45.   *13,K3,CO5*

OR

b) A Kaplan turbine working under a head of 29m develops 1287.5kW S.P If the speed ratio is equal to 2 flow ratio = 0.62, diameter of boss = 0.34 times the diameter of the runner and overall efficiency of the turbine = 89%, find the diameter of the runner and the speed of turbine.   *13,K3,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) A centrifugal pump with 1.2 m outer diameter of impeller and inner diameter of impeller being 0.6m. Runs at 200 r.p.m and pumps 1880 lps with an average life of 6 m. Angle of vanes at exit with the tangent to the impeller is 26^0 and the radial velocity of flow is 2.5 m/s. Compute the manometric efficiency and the least speed to start pumping.   *15,K3,CO6*

OR

b) A single acting reciprocating pump running at 30 r.p.m delivers 0.015 m^3/s of water. The diameter of the piston is 25cm and stroke length is 50cm. Determine: (i) The theoretical discharge of the pump, (ii) Co-efficient of discharge, and (iii) Slip and percentage slip of pump.   *15,K3,CO6*