

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025

Fourth Semester

Civil Engineering

CE3401 - Applied Hydraulic Engineering

Regulations - 2021

Duration : 3 Hrs

Maximum : 100 Marks

PART - A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	Define Prismatic and non prismatic channels.	L1	1	2
2.	What are the properties of open channels?	L1	1	2
3.	Write the types of flow profiles.	L1	2	2
4.	Distinguish between draw down curve and back water curve.	L2	2	2
5.	Classify the hydraulic jumps.	L2	3	2
6.	Explain surges and write its types.	L2	3	2
7.	Define impact of vanes.	L1	4	2
8.	What is meant by draft tube? Why it is used?	L1	4	2
9.	List the components of centrifugal pumps.	L1	5	2
10.	What is an air vessel and write its functions?	L2	5	2

PART - B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a i Identify the difference between pipe flow and open channel flow.	L3	1	6
	ii The discharge of water through a rectangular channel of width 10m is 25 m ³ /s. When the depth of flow is 2m. Calculate (i) Specific energy of flowing water (ii) Critical depth and critical velocity	L3	1	10
	Or			
	b A trapezoidal channel with side slopes of 3H: 2V has to be designed to convey 10 m ³ /s at a velocity of 1.5 m/s, so that the amount of concrete lining for the bed and the sides is minimum. Solve (i) Wetted perimeter (ii) Slope of the bed if Manning's N as 0.014	L3	1	16
12.	a i Derive the dynamic equations of gradually varied flow.	L3	2	8
	ii Explain the characteristics of M ₂ and S ₂ profiles for draw down curves with neat sketches.	L3	2	8
	Or			
	b Determine the length of the backwater curve caused by afflux of 2.5 m in a rectangular channel of width 40 m and depth 2.5 m. The slope of the bed is given as 1 in 11000. Take Manning's N as 0.03.	L3	2	16

13.	a	Obtain an expression for the sequent depth and length of hydraulic jump under rapidly varied flow conditions.	L3	3	16
		Or			
	b	A rectangular channel carries a flow with a velocity of 0.65 m/s and depth of flow 1.4 m. The discharge is abruptly increased by three fold by sudden lifting a gate on the upstream. Estimate the velocity and the height of resulting surge.	L3	3	16
14.	a	A Kaplan turbine develops 24000 kW power at an average head of 39 m. By assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and an overall efficiency of 90%. Calculate the diameters, speed and specific speed of the turbines.	L3	4	16
		Or			
	b	A Pelton wheel is to be designed for a head of 40 m, when running 180 rpm. The Pelton wheel develop 90.64 kW shaft power. The velocity of buckets is 0.5 times the velocity of jet, overall efficiency=0.90. The co-efficient of the velocity is equal to 0.94.	L3	4	16
15.	a	A Centrifugal Pump having outer diameter equal to two times the inner diameter and running at 1000 r.p.m works against at total head of 40 m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are set back at an angle of 40 at the outlet. If the outer diameter of the impeller is 500 mm and the width at outlet is 50 mm. Determine: (i) Vane angle at the inlet (ii) Work done by the impeller (iii) Manometric efficiency	L3	5	16
		Or			
	b	The cylinder bore diameter of a single-acting reciprocating pump is 150 mm and its stroke is 300 mm. The pump runs at 50 rpm and lifts water through a height of 25 m. The delivery pipe is 22 m long and 100 mm in dia. Find the theoretical discharge and the theoretical power required to run the pump. If the actual discharge is 4.2 liters/s. Find the percentage of slip. Also determine the acceleration head at the beginning and middle of the delivery stroke.	L3	5	16