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Question Paper Code	13467

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025
Fourth Semester
Civil Engineering
20CEPC401 - APPLIED HYDRAULIC ENGINEERING
Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
Answer ALL Questions

		Marks	K–Level	CO

1. The flow characteristics of a channel does not change with time at any point. What type of flow is it? — 1, K1, CO1
   (a) Steady flow   (b) Uniform flow   (c) Laminar flow   (d) Turbulent flow

2. Which geometric parameter determines the efficiency of the channel? — 1, K1, CO1
   (a) Hydraulic depth   (b) Hydraulic radius   (c) Section factor   (d) Normal depth

3. For a rectangular channel, the best hydraulic section occurs when: — 1, K1, CO2
   (a) Depth is equal to twice the width   (b) Width is equal to twice the depth
   (c) The hydraulic radius is minimized   (d) Wetted perimeter is minimized

4. The point of minimum specific energy for a given discharge in an open channel flow corresponds to which flow condition? — 1, K1, CO2
   (a) Subcritical flow   (b) Supercritical flow   (c) Critical flow   (d) Rapidly varied flow

5. What does "gradually varied flow" mean in open channel hydraulics? — 1, K1, CO3
   (a) Flow where the depth changes abruptly along the channel.
   (b) Flow where the depth changes slowly along the length of the channel.
   (c) Flow with constant velocity throughout the channel length.
   (d) Flow that is uniform across any cross-section.

6. What type of water surface profile is formed when the flow is subcritical and the channel slope is less than the critical slope? — 1, K1, CO3
   (a) M1 profile   (b) S1 profile   (c) C1 profile   (d) H1 profile

7. What is the purpose of energy dissipation in open channels through hydraulic jumps? — 1, K1, CO4
   (a) To reduce sediment transport downstream   (b) To prevent channel erosion
   (c) To minimize turbulence upstream   (d) To increase downstream flow velocity

8. Analysis of a surge in open channel is done by using — 1, K1, CO4
   (a) Continuity Equation   (b) Energy Equation
   (c) Momentum Equation   (d) None of the above

9. Which place in hydraulic turbine is most susceptible for cavitation — 1, K1, CO5
   (a) Inlet of draft rube   (b) Blade inlet   (c) Guide blade   (d) Draft tube exit

10. The process of filling the liquid into the suction pipe and the pump casing up to the level of the delivery valve is called _____. — 1, K1, CO6
   (a) Filling   (b) Pumping   (c) Priming   (d) Leveling

PART - B (12 × 2 = 24 Marks)
Answer ALL Questions

No.	Question	Marks	K–Level	CO
11.	Describe the Open channel flow.	2	K1	CO1
12.	Write the flow based on Froude number.	2	K1	CO1
13.	What is meant the most economical section of a channel?	2	K1	CO2
14.	Explain the terms in brief: Specific Energy and Critical depth.	2	K2	CO2
15.	Explain the term of GVF.	2	K2	CO3
16.	List the classification of flow profile.	2	K1	CO3
17.	Illustrate about rapidly varied flow with example.	2	K2	CO4
18.	Define Surges with examples.	2	K1	CO4

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13467**

19.		Differentiate between an impulse turbine and a reaction turbine.	*2*	*K2*	*CO5*
20.		What you meant by specific speed of turbine?	*2*	*K1*	*CO5*
21.		Define NPSH and its application.	*2*	*K1*	*CO6*
22.		Describe the negative slip.	*2*	*K1*	*CO6*

PART - C (6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	Explain the types and properties of open channel flow.	*11*	*K2*	*CO1*

OR

	b)	Derive a relation for Chezy's equation for a Uniform flow.	*11*	*K2*	*CO1*

24.	a)	Derive the expressions for most economical trapezoidal channel. (i) Half of top width = Length of one of the sloping sides and (ii) Hydraulic mean depth = ½ depth of flow.	*11*	*K2*	*CO2*

OR

	b)	A 3m wide rectangular channel conveys $12m^3$ of water at a depth of 2m. Determine (a) Specific energy of flowing fluid. (b) Critical depth, critical velocity and the minimum specific energy. (c) Froude number and state whether the flow is sub-critical or supercritical.	*11*	*K3*	*CO2*

25.	a)	Derive the dynamic equation for the Gradually Varied Flow and state clearly the assumptions in analysis of GVF.	*11*	*K3*	*CO3*

OR

	b)	Determine the length of the backwater curve in a rectangular channel width of 4m depth of water at upstream side 2m and downstream side 3m discharge of channel is 15 m^3/s. Take i_b =1/2000 & i_e=0.000031.	*11*	*K3*	*CO3*

26.	a)	The depth of flow of water at a certain section of rectangular channel 5m wide is 0.6m. The discharge through a channel is 15 m^3 /s. if hydraulic jump take place on the downstream side. Find the depth of flow after jump, height of the hydraulic jump and loss of energy per kg of water.	*11*	*K3*	*CO4*

OR

	b)	Discuss the types of hydraulic jump with a suitable sketch and mention their applications.	*11*	*K2*	*CO4*

27.	a)	Explain the classification of turbines with its merits and demerits.	*11*	*K2*	*CO5*

OR

	b)	Compute the diameter of Pelton turbine and jet which develops 3000 Kw under a head of 300 m having an overall efficiency of 83%, speed ratio = 0.46, coefficient of velocity (Cv) = 0.98, and specific speed (N) = 16.5	*11*	*K3*	*CO5*

28.	a)	What is a reciprocating pump? Describe the principle and working of a reciprocating pump with a neat sketch.	*11*	*K2*	*CO6*

OR

	b)	A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 r.p.m. works against a total head of 40 m. The velocity of low through the impeller is constant and equal to 2.5 m/s. The vane is set back at an angle of 40o at outlet. If the outer diameter of the impeller is 500 mm and width at outlet is 50 mm. Determine: (i) Vane angle at inlet and (ii) Work done by impeller on water per second.	*11*	*K3*	*CO6*