



Paper id: 252771

Printed Page: 1 of 2  
Subject Code: BCE403

Roll No:

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**BTECH**  
**(SEM IV) THEORY EXAMINATION 2024-25**  
**HYDRAULIC ENGINEERING AND MACHINES**

TIME: 3 HRS

M.MARKS: 70

**Note:** Attempt all Sections. In case of any missing data; choose suitably.**SECTION A****1. Attempt all questions in brief.****02 x 7 = 14**

Q no.	Question
a.	What are energy dissipaters and where are they used?
b.	Write a short note on the Parshall flume.
c.	Define different types of flow.
d.	Write the types of surges
e.	What is the most efficient channel section and why?
f.	Write the Chezy's equation for uniform flow and explain its parameters.
g.	Name and define three devices used for discharge measurement.

**SECTION B****2. Attempt any three of the following:****07 x 3 = 21**

a.	Explain Chezy's and Manning's equations for uniform flow
b.	Compare Francis and Kaplan turbines in terms of efficiency and application
c.	A trapezoidal channel with side slopes of 2(H):1(V) has to be designed to carry 20 m <sup>3</sup> /sec at a slope of 1/5500. Determine the depth of flow. Bottom width = 3.0 m and Manning's coefficient = 0.015.
d.	Draw neat sketch of various shapes of draft tubes. Also explain the theory of draft tube.
e.	What is NPSH of centrifugal pump? How it is related to cavitations in pump?

**SECTION C****3. Attempt any one part of the following:****07 x 1 = 07**

a.	Explain the working of Peloton turbine with a neat diagram
b.	A wide rectangular channel carries a flow of 2.75 m <sup>3</sup> /sec per meter width, the depth of flow being 1.5 m. Calculate the rise of the floor level required to produce a critical flow condition. What is the corresponding fall in surface level?

**4. Attempt any one part of the following:****07 x 1 = 07**

a.	Compare centrifugal and reciprocating pumps with examples
b.	Uniform flow occurs at a depth of 1.5 m in a long rectangular channel 3 m wide and laid to a slope of 0.0009. If Manning's n = 0.015 Calculate (a) Maximum height of hump on the floor to produce critical depth (b) The width of contraction which will produce critical depth without increasing the upstream depth of flow.

**5. Attempt any one part of the following:****07 x 1 = 07**

a.	Explain impulse momentum principle and its application to jet impact
b.	A natural channel with 50 m width and 1.50 m deep has an average bed slope of 0.0005. Estimate the length of the GVF profile produced by a low weir which raises the water surface just upstream of it by 0.75 m. Assume n = 0.035.



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**6. Attempt any *one* part of the following:**

**07 x 1 = 07**

a.	Explain the difference between deep and shallow water waves.
b.	Show that in rectangular channel maximum discharge occurs when the flow is critical for a given value of specific energy.

**7. Attempt any *one* part of the following:**

**07 x 1 = 07**

a.	A Pelton wheel turbine is to be designed for the following specifications: Shaft power = 11,775 kW , Head 400 m, speed = 750 rpm, Overall efficiency = 86% , Jet diameter to wheel diameter ratio is not to exceed one sixth (1/6). Find Wheel diameter and Jet diameter.
b.	Show that in rectangular channel maximum discharge occurs when the flow is critical for a given value of specific energy.

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