41N0304

Roll No _____ Total No. of Pages.: 02

41N0304

B.Tech IV Sem Main/Back (New Scheme) 2025-26

Civil Engineering

(4CE4-04) – Hydraulics Engineering

Time : 3 Hours **Maximum Marks: 70**
Min. Passing Marks:

Instructions to Candidates:

Part-A: Short answer questions (up to 25 words) 10x2 marks = 20 marks. All ten questions are compulsory.

Part- B: Analytical/Problem Solving questions 5x4 marks = 20 marks. Candidates have to answer 5 questions out of 7.

Part – C: Descriptive/Analytical/Problem Solving questions 3x10 marks = 30 marks. Candidates have to answer 3 questions out of 5.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1__NIL_____ 2____NIL_____

Part-A

Q.1.	Explain the dynamic similarity.	[2]
Q.2.	Illustrate the Rayleigh's method.	[2]
Q.3.	What do you understand by most efficient channel section?	[2]
Q.4.	Explain the uniform and non-uniform flow.	[2]
Q.5.	What is meant by prismatic channel?	[2]
Q.6.	Enlist the types of canals.	[2]
Q.7.	What is aquifer and give its types?	[2]
Q.8.	Differentiate between the critical and sub critical flow.	[2]
Q.9.	What do you understand by priming?	[2]
Q.10.	Differentiate between pumps and turbines?	[2]

PART-B

Q.1.	The force required to tow a 1:30 scale model of a motor boat in a lake at a speed of 2 m/s is 0.5N. Assume that the viscous resistance due to water and air is negligible in comparison with the wave resistance, calculate the corresponding speed of the prototype for dynamically similar conditions.	[4]
Q.2.	What is meant by separation of boundary layer. Describe with sketches the methods of control separation.	[4]
Q.3.	Derive an expression for the best side slope of the most economical trapezoidal channel.	[4]
Q.4.	Give the classification of turbines according to specific speed and head.	[4]
Q.5.	Explain the specific curve for energy of gradually varied flow with neat and clean diagram.	[4]
Q.6.	Describe the main components and working of reciprocating pump with a neat sketch.	[4]
Q.7.	Discuss briefly on various types of rain gauges.	[4]

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PART- C

Q.1. The rate of flow Q of a fluid property namely density ρ and viscosity μ is to be measured by means of an orifice meter of diameter d installed in a pipeline of diameter D. The pressure drop across the orifice plate is Δp. Show by using the method of dimensional analysis that, $Q = Cd^2\sqrt{\frac{\Delta p}{\rho}}$, in which C is discharge coefficient dependent upon the parameter $\rho Q / \mu d$ and d / D. https://www.rtuonline.com [10]

Q.2. A trapezoidal channel to carry 142 m^3/min. of water is designed to have a minimum cross-section. Find bottom width and depth, if the bed slope is 1 in 1200, the side slope at 45^0 and Chezy's Coefficient = 55. [1+3]

Q.3. A jet of water 75 mm diameter having a velocity of 20 m/sec, strikes normal to a flat smooth plate, Determine the thrust on the plate if (i) the plate is at rest (ii) the plate is moving in the same direction as the jet with a velocity of 5 m/sec. Also find the work done per second on the plate in each case and the efficiency of the jet when the plate is moving. [10]

Q.4. (a) In a catchment with four rain gauge stations, the annual average rainfall is recorded as 800, 400, 540, and 620 mm respectively. If it is required to keep the error within 10%, find the optimum number of rain gauge stations. [4]

(b) Differentiate between Kennedy's theory and Lacey's theory. [6]

Q.5. Write notes on any two from the following: [5+5]

(a) Hydrologic cycle and its components

(b) Unit hydrograph and its applications

(c) Silt control in canal.

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