



Term Evaluation (Even) Semester Examination March 2025

Roll no.....

Name of the Course: B. Tech (Civil Engineering)

Semester: IV

Name of the Paper: Hydraulics and Hydraulic Machines

Paper Code: TCE 401

Time: 1.5 hour

Maximum Marks: 50

Note:

- (i) Answer all the questions by choosing any one of the sub-questions
- (ii) Each question carries 10 marks.
- (iii) Please specify COs against each question.

Q 1.

10 Marks

- a) State Rayleigh method of dimensional analysis and explain procedure for the analysis. **CO 1**

(OR)

- b) A pump develops a power P which is a function of the discharge (Q), the head (H) and the specific weight (γ) of the fluid. Show that $P = KQ\gamma H$. Where, K is a dimensionless constant. **CO 1**

Q 2.

10 Marks

- a) Show that for critical flow at a section the Froude's number is equal to unity **CO 1**

(OR)

- b) A trapezoidal Channel having the side slope equal to 60° with the horizontal and laid on a slope of 1 in 750, carries a discharge of $10 \text{ m}^3/\text{s}$. Find the width at the base and depth of the flow for the most economical section. Take Chezy's $C = 66$. **CO 1**

Q 3.

10 Marks

- a) Draw a neat sketch of specific energy curve for an open channel with constant discharge and show the regions of subcritical, critical and supercritical flow on it. **CO 1**

(OR)

- b) A rectangular channel has a width of 2.0 m and carries a discharge of $4.80 \text{ m}^3/\text{s}$ with a depth of 1.60 m. at a certain section a small, smooth hump with a flat top and of height 0.10 m is proposed to be built. Calculate the likely change in the water surface. Neglect the energy loss. **CO 1**

Q 4.

10 Marks

- a) Show that the brink depth is two-third of critical depth in an open rectangular channel **CO 2**

(OR)

- b) A 3.6m wide rectangular channel conveys $9 \text{ m}^3/\text{s}$ of water with a velocity of 6 m/s. Is there a condition for hydraulic jump to occur? If so, calculate the height of jump and loss of energy. **CO 2**

Q 5.

10 Marks

- a) What do you understand by Surges in open channel? Differentiate between positive and Negative Surges. **CO 2**

(OR)

- b) In a tidal river the depth and velocity of flow are 0.90m and 1.25m/s respectively. Due to tidal action a tidal bore of height 1.20m is observed to travel upstream. Estimate the height and speed of the bore and the speed of flow after the passage of bore. **CO 2**