Total No. of Question : [4]

Registration No. :

Programme Name : Bachelor of Civil Engineering
Regular S.Y.B.Tech.Sem.IV ESE May / June 2023
IV SEMESTER (2021 BATCH)
201CEL215-Open Channel Hydraulics & Hydraulic Machines

Duration :   **Marks : 50**
Instructions :

(Q1) Attempt all the subquestions   [20.0]

   (1.1) Find the normal depth & critical depth for a wide rectangular channel carrying   [6.0]
   discharge of 4m^3/s/m width . Channel bedslope is 1 in 1600 , n = 0.03 .At a section the
   actual depth is 2m. Calculate Froud's number. What is the type of flow ?

   CO :- c215.1
   Blooms Taxonomy :- Understand

   (1.2) Find the length of a GVF profile between 2m & 3m depths of flow. Discharge is 5   [8.0]
   m^3/s/m width. Channel is a wide rectangular channel laid on bed slope 1 in 900, n=
   0.02. Take 2 steps. Show the calculations in tabular form. Sketch the GVF profile.

   CO :- c215.2
   Blooms Taxonomy :- Apply

   (1.3) On a horizontal floor of rectangular channel of base width 2 m, a hydraulic jump is   [6.0]
   created with initialdepth 0.5m. Total discharge is 20m^3/s. Find sequent depth & power
   lost.

   CO :- c215.2
   Blooms Taxonomy :- Apply

(Q2) Attempt following all sbquestions   [10.0]

   (2.1) A laboratory channel 1.0 wide fitted with a rectangular contracted notch of crest length   [5.0]
   70cm.If head over the crest is 20cm, find the discharge passing through channel
   considering end contractions. What would be the velocity of approach of flow, if crest is
   25cm above the bottom of channel. Assume appropriate value of C_d.

   CO :- c215.2
   Blooms Taxonomy :- Apply

   (2.2) What is weir ? What are different types of weir ? State the Francis formula. How weirs   [5.0]
   are used for discharge measurement of river flow ?
   OR
   What is Notch and weir ? Differentiate their uses. How the the discarge calculations
   are correctd for error in measurement of head over the crest ?

CO :- C215.3
Blooms Taxonomy :- Apply

(Q3) Attempt all subquestions   [10.0]

    (3.1) If a rectangular notch is of crest length 1m is attached to a tank of size 5m x 5m. What [5.0]
would be the time taken for lowering the water level in the tank due to discharge
through notch from 3m to 2m. Assume appropriate coefficient of discharge.

        CO :- C215.3
        Blooms Taxonomy :- Apply

    (3.2) Find the work done by a semicircular curved vane, when a jet of 5cm diameter [5.0]
strikesthe vane normally at the centre. Velocity of jet water jet is 20m/s & vane moves
withvelocity 4m/s in the jet direction. Neglect all the losses. Draw a sketch.

(Q4) Attempt any 2 subquestions   [10.0]

    (4.1) Draw a schematic sketch of Pelton wheel turbine & give its working. [5.0]

        CO :- C215.4
        Blooms Taxonomy :- Apply, Understand

    (4.2) Explain the working of centrifugal pump with its different types. [5.0]

        CO :- C215.4
        Blooms Taxonomy :- Apply, Understand

    (4.3) The quantity of water available for hydraulic power station is $350m^3$/s under a head of [5.0]
25m. Assuming the speed of turbines to be 200 rpm & with 82 % efficiency, determine
the least number of Francis of turbines of same size, that will be needed. Specific
speedof Francis turbine N_s = 400.

        CO :- C215.4
        Blooms Taxonomy :- Apply, Understand

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