C

Reg. No. : ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

Question Paper Code: U4106

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Fourth Semester

Civil Engineering

21UCE406-APPLIED HYDRAULIC ENGINEERING

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer All Questions

PART A - (5 x 1 = 5Marks)

1. A rectangular open channel carries a discharge of 15 m^3/s when the depth of flow is 1.5 m and the bed slope is 1: 1440.What will be the discharge through the channel at the same depth if the slope would have been 1:1000?   CO3-Ana

   (a) 21.6 m^3/s   (b) 18 m^3/s   (c) 14.4 m^3/s   (d) 12.5 m^3/s

2. The dynamic equation for the slope of water surface in a GVF is not valid for super critical flow   CO3-Ana

   (a) True   (b) False   (c) None of the above   (d) All of the above

3. A hydraulic jump takes place in a frictionless rectangular channel. The pre-jump depth is y_p. The alternate and sequent depths corresponding to y_p are y_a and y_s respectively. The correct relationship among y_p, y_a and y_s is: CO1-U

   (a) $y_a < y_s < y_p$ (b) $y_p < y_s < y_a$ (c) $y_p < y_s = y_a$ (d) $y_p = y_s = y_a$

4. The overall efficiency for a Pelton wheel lies between   CO1- U

   (a) 0.65 to 0.75   (b) 0.50 to 0.65   (c) 0.75 to 0.85   (d) 0.85 to 0.90

5. Cavitation can takes place in case of   CO1- U

   (a) Pelton Wheel   (b) Francis Turbine   (c) Reciprocating Pump   (d) Centrifugal Pump

PART – B (5 x 3= 15Marks)

6. What are the factors affecting Manning's roughness coefficient   CO1 - U

7. State the assumptions made in the derivation of dynamic equation of gradually varied flow.   CO2 -App

8. What are surges in open channel flow? State the types? CO1 - U

9. Draw typical velocity triangles for inlet and outlet of Pelton Wheel CO1 - U

10. Define the term negative slip. How it occurs CO1 - U

PART – C (5 x 16= 80Marks)

11. (a) Find the velocity of flow and rate of flow of water through a CO2- App (16)
rectangular channel of 6m wide and 3m deep, when it's running
full. The channel is having bed slope as 1 in 2000.Take c=55

Or

(b) Water flows at rate of 20m^3/sec in a rectangular channel 14 m CO2- App (16)
wide at a velocity of 1.8 m/sec. Determine the specific energy of
flowing water, critical velocity ad minimum specific energy
.Corresponding to the discharge ,the Froude number and state
whether the flow is sub critical or super critical

12. (a) Find the Dynamic equation of GVF by applying the suitable CO2- App (16)
assumptions

Or

(b) A trapezoidal channel with bed width of 10m and side slopes CO2- App (16)
1Vertical: 1.5Horizontalis carrying a flow of 80m^3/s. The channel
bottom slope is 0.002 and Manning's constant N is 0. 015.A dam
planned in such a way that the flow depth increases to
10m.Determine the depth of flow in the channel 250m,500m and
750m upstream of the dam.

13. (a) The water's depth changes from 0.5 meters to 0.7 meters during CO2- App (16)
an experiment on a hydraulic leap in a rectangular open channel
that is 0.8 meters wide. Enumerate the head loss resulting from
the development of hydraulic jumps and the discharge in the
channel.

Or

(b) When there is a hydraulic jump in a rectangular channel, the CO2- App (16)
energy loss is 4 meters and the fe number prior to the jump is
30.Calculate the depth of flow and flow rate.

U4106

14. (a) A Pelton wheel is to develop 8825 kW under a net head of 300m, while running at a speed of 540 rpm. If the coefficient of the jet is 0.987, speed ratio is 0.46.Assuming the jet ratio as 10 & overall efficiency as 84%, Find Diameter of the jet, Diameter of the wheel, Discharge, Number of jets.　　CO4- App　(16)

Or

(b) A Kaplan turbine is to be designed to develop 20000 KW .The net available head is 35m.The speed ratio is 2 and the flow ratio is 0.6.The overall efficiency is 86% and diameter of the boss is one - third the diameter of the runner .Determine the diameter of the runner, speed, and specific speed of the turbine.　　CO4- App　(16)

15. (a) In an industry, it is expected to transfer high pressure liquid from chamber to another in high velocity. Suggest a suitable pump system and discuss about its principles, working with neat sketch.　　CO4- App　(16)

Or

(b) What is difference between Pump head &Discharge Pressure? How to Convert discharge pressure into head?　　CO4- App　(16)

U4106

U4106