C

Question Paper Code: 54106

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Fourth Semester

Civil Engineering

15UCE406- APPLIED HYDRAULIC ENGINEERING

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The minimum specific energy in terms of critical depth is   CO1- R

    (a) $3b/2h_c$ (b) $3/4h_c$ (c) $5/2h_c$ (d) $3/2h_c$

2. Manning's formula is used to find out   CO2- R

    (a) Discharge of flow in steams   (b) Velocity of flow in steams

    (c) Area of cross section   (d) None of the above

3. The following one is not the water profile   CO3- R

    (a) Mild curve   (b) Smooth curve   (c) Steep curve   (d) Horizontal curve

4. Draft tubes are used in   CO4- R

    (a) Pelton turbine   (b) Impulse turbine   (c) Kaplan turbine   (d) None of the above

5. Slip is the   CO5-R

    (a)Theoretical discharge – Actual discharge (b) Actual discharge - Theoretical discharge

    (c) No discharge   (d) High discharge

PART – B (5 x 3= 15 Marks)

6. Define hydraulic depth of an open channel flow.   CO1- R

7. Write Manning's and Chezy's formula.   CO2- R

8. Illustrate back water and draw down curve.   CO3- R

9. Give examples for Impulse turbine and reaction turbine. CO4- R

10. Draw sketch showing indicator diagram of pump. CO5- R

PART – C (5 x 16= 80 Marks)

11. (a) The discharge of water through a rectangular channel of width CO1- App (6)
10m, is 22 m³/s when the depth of flow of water is 1.6m,
calculate

    (i) Specific energy

    (ii) Critical depth and critical velocity CO1- App (4)

    (iii) Minimum specific energy. CO1- App (6)

Or

(b) Define specific energy. Draw a neat sketch of specific energy CO1- U (16)
curve and explain the salient points.

12. (a) (i) A trapezoidal canal has side slopes 3H to 4 V and slope of its CO2- App (10)
bed is 1in 2000. Determine the optimum dimensions of the canal,
if it has to carry water at 0.5m³/s.

    (ii) Derive the conditions for best rectangular section. CO2- App (6)

Or

(b) Calculate the normal depth of flow for a trapezoidal channel CO2- App (16)
having side slopes 2H to 1V and bottom width 5 meter ,
discharging 8 m³/s. Take N = 0.025 and slope as 1/750.

13. (a) The depth of flow of water at a certain section of a rectangular CO3- Ana (16)
channel is 2m wide & 0.3m. The discharge through the channel is
1.5 m³/s. determine whether the hydraulic jump will occur or not,
if so find its height, loss of energy per kg of water and power lost.

Or

(b) Derive the dynamic equation of Gradually Varied flow. CO3- Ana (16)

14. (a) A Pelton wheel is to be designed for a head of 60m running at CO4- App (16)
200 rpm. The Pelton wheel develops 95.64KW power. The
velocity of the bucket is 0.45 times the velocity of the jet. Overall
efficiency is 0.85 and coefficient of the velocity is = 0.98 .

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<div align="center">Or</div>

(b) (i) Write various classifications of turbines. CO4- U (8)

(ii) Define draft tube. Explain the various types of draft tubes CO4- U (8)
with sketches.

15. (a) Single acting reciprocating pump has a diameter of 90mm and CO5- App (16)
stroke length 60mm. The length and the diameter of the suction
pipe are 5.0m and 50mm respectively. If the suction lift of the
pump is 5.2m and separation occurs when pressure in the pump
falls below 2.5m of water absolute. Find the maximum speed at
which the pump can be run without separation in the pipe.

<div align="center">Or</div>

(b) Draw a neat sketch of centrifugal pump and explain the working CO5- U (16)
principle of Centrifugal pump.

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