Reg. No. :

Question Paper Code: 54016

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

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. Which one of the following formula is suitable for Hydraulic Radious

    (a) $R = [A/P]$ (b) $R = [A/T]$ (c) $R = [A/D]$ (d) $R = [A^3 / T]^{1/2}$

2. The value of Manning's roughness coefficient for smooth concrete is

    (a) 0.012   (b) 0.011   (c) 0.010   (d) 0.014

3. The _____ is defined as the sudden and turbulent passage of water from a supercritical state to subcritical state

    (a) Hydraulic jump   (b) Open channel flow
    (c) Critical slope   (d) Mild slope

4. Hydraulic turbines are the machines which use the energy of water and convert into

    (a) Hydraulic energy   (b) Power energy
    (c) Mechanical energy   (d) Generator energy

5. Write down the formula for calculating theoretical discharge for single-acting reciprocating pump

    (a) $Q_{th} = ALN/80$ (b) $Q_{th} = ALN/60$
    (c) $Q_{th} = ADN/60$ (d) $Q_{th} = ALN/100$

PART - B (5 x 3 = 15 Marks)

6. List out the types of flow in channels.

7. Define the term specific energy of flow.

8. Give the classifications of channel bottom slopes.

9. List out the purposes of draft tubes.

10. Summarize the applications of air vessels.

PART - C (5 x 16 = 80 Marks)

11. (a) With help of neat sketch, Explain in detail about Specific energy and Specific energy curve. (16)

Or

(b) Discuss the different types of flow in open channels. (16)

12. (a) A flow of 100 litres per second flows down in a rectangular laboratory flume of width 0.6 m and having adjustable bottom slope. If Chezy's C is 56. Determine the bottom slope necessary for uniform flow with a depth of flow 0.3 m. Also find the conveyance and the state of flow (i.e., tranquil or rapid). (16)

Or

(b) A circular sewer 0.6 m inside diameter has a slope of 1in 400. Find the depth when the discharge is 0.283 m^3/s, taking C in Chezy's formula as 50. (16)

13. (a) A sluice gate discharges water into a horizontal rectangular channel with a velocity of 6 m/s and depth of flow is 0.4 m. The width of the channel is 8 m. Determine whether a hydraulic jump will occur, and if so, find its height and loss of energy per kg of water. Also determine the power lost in the hydraulic jump. (16)

Or

(b) A sluice gate discharges 2.5m^3/s into a horizontal rectangular channel. The depth of vena contract a is 0.2m. The tail water depth is 2m Assuming n=0.015, determine the location of hydraulic jump. Take bed slope as 0.0005. (16)

14. (a) A Kaplan turbine develops 24647.6 kW power at an average head of 39 meters. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and an overall efficiency of 90%, calculate the diameter, speed and specific speed of the turbine. (16)

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Or

(b) Discuss the function and types of draft tubes in reaction turbines. (16)

15. (a) A centrifugal pump delivers water against a net head of 14.5 meters and a design speed of 1000 r.p.m. The vanes are curved back to an angle of 30^0 with the periphery. The impeller diameter is 300 mm and outlet width 50 mm. Determine the discharge of the pump if manometric efficiency is 95 %. (16)

Or

(b) Explain the working of single acting and double acting reciprocating pumps. (16)

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