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Question Paper Code: 31145

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

Fourth Semester

Civil Engineering

01UCE405 - APPLIED HYDRAULIC ENGINEERING

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Write down the characteristics of boundary layer.
2. Define flow regime.
3. Define hydraulic depth of an open channel flow.
4. Differentiate uniform and non uniform flow in open channel with sketch.
5. Define alternate depths in an open channel.
6. Draw and explain back water curve for open channels.
7. Define Cavitation.
8. What are multistage pumps?
9. Write down the advantages of centrifugal pump over reciprocating pump.
10. What is called negative slip in reciprocating pump?

PART - B (5 x 16 = 80 Marks)

11. (a) Derive the expression for finding momentum. (16)

Or

- (b) A horizontal pipe line 40 m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 25 m of its length

from the tank, the pipe is 150 mm diameter and its diameter is suddenly enlarged to 300 mm. The height of water level in the tank is 8 m above the centre of the pipe. Considering all losses of head, determine the rate of the flow. (16)

12. (a) The discharge of water through a rectangular channel of width 8 m, is $15 \text{ m}^3/\text{s}$. When the depth of flow of water is 1.2 m calculate
- (i) Specific energy. (8)
 - (ii) Critical depth and critical velocity. (8)

Or

- (b) A trapezoidal channel is required to carry $8 \text{ m}^3/\text{sec}$ of the water at a velocity of 2 m/s. Find the most economical cross section if the channel has side slopes 1 horizontal to 2 vertical. For the same discharge what amount of saving in power would result if this trapezoidal section is replaced by a rectangular section 1.5 m deep and 4 m wide? Take Chezy's constant $C = 55$. (16)

13. (a) Determine the length of back water curve caused by an afflux of 2.0 m in a rectangular channel of width 40 m and depth 2.5 m. The bed slope is 1/1000. (16)

Or

- (b) A wide channel laid to a slope of 1 in 1000 carries a discharge of $3.5 \text{ m}^3/\text{sec per meter}$ width at a depth of 1.6 m. Find out the value of Chezy's constant C. Consider the flow to be uniform. If the actual depth varies from 1.5 m at an upstream location to 1.7 m at a location 300 m downstream or in other words the flow is gradually varied. What will be the value of Chezy's constant. (16)

14. (a) (i) Write the various classifications of turbines. (8)
- (ii) Define draft tube. Explain the various types of draft tubes with sketches. (8)

Or

- (b) Design a Pelton wheel. The following data relate to a Pelton wheel: head, speed of the wheel, shaft power of the wheel, speed ratio, coefficient of velocity and overall efficiency are 72 m, 240 r.p.m, 115 kW, 0.45, 0.98 and 58% respectively. (16)

15. (a) Explain how are the reciprocating pumps are classified. Describe the principle and working procedure of a reciprocating pump. (16)

Or

- (b) With neat sketch, explain the working principle of centrifugal pump. (16)