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Question Paper Code: 41145

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

Fourth Semester

Civil Engineering

14UCE405 - APPLIED HYDRAULIC ENGINEERING

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. If the Reynolds number is more than 5×10^5, the boundary layer is called as

    (a) Laminar boundary layer   (b) Turbulent Boundary layer
    (c) Laminar sub layer   (d) Turbulent sub layer

2. The boundary layer separation takes place if

    (a) pressure gradient is Zero   (b) pressure gradient is positive
    (c) pressure gradient is negative   (d) Pressure gradient is more

3. If the depth of flow in a channel changes gradually over a long length of the channel, the flow is

    (a) Rapidly Varied Flow   (b) Gradually Varied Flow
    (c) Both the above   (d) None of these

4. The head loss in pipe due to friction is calculated by

    (a) Chezy's Formula   (b) Darcy Weisbach Formula
    (c) Both (a) and (b)   (d) none of these

5. The maximum increases in water level due to obstruction in the path of flow of water is

    (a) Afflux   (b) Backwater   (c) Dropdown   (d) Both (a) and (b)

6. If the depth of flow in a channel is less than the critical depth, the flow is

    (a) Shooting flow   (b) Critical Flow

    (c) Sub critical Flow   (d) Streaming Flow

7. If at the Inlet of the turbine, the energy available is only kinetic energy, the turbine is known as

    (a) Impulse turbine   (b) Reaction Turbine

    (c) Axial flow turbine   (d) Mixed flow turbine

8. The ratio of the power available at the shaft of the turbine to the power delivered to the runner is

    (a) Hydraulic Efficiency   (b) Mechanical Efficiency

    (c) Overall Efficiency   (d) Volumetric Efficiency

9. The vertical height of the centre line of the centrifugal pump from the water surface in the pump is called as

    (a) Suction head   (b) Delivery head

    (c) Manometric head   (d) Static head

10. The rotating part of the centrifugal pump is

    (a) Impeller   (b) Casing   (c) Suction pipe   (d) Delivery pipe

PART - B (5 x 2 = 10 Marks)

11. What is Friction factor?

12. What are the types of Flow?

13. Give the assumptions of Gradually Varied Flow.

14. How will you classify the Turbines?

15. Differentiate between volute casing and vortex casing.

PART - C (5 x 16 = 80 Marks)

16. (a) Find the displacement thickness, momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $u/U = 2(y/\delta) - (y/\delta)^2$.   (16)

Or

(b) Derive Hagen Poiseuille Formula.   (16)

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17. (a) A horizontal pipe of diameter 500mm is suddenly contracted to a diameter of 250mm. the pressure intensities in the large and the smaller pipe is given as $13.734 N/cm^2$ and $11.772 N/cm^2$ respectively. Find the loss of head due to contraction if $C_c = 0.62$. Also determine the rate of flow of water. (16)

Or

(b) Derive Von Karman Momentum integral equation. (16)

18. (a) Give the Expression for Gradually Varied Flow in detail. (16)

Or

(b) Define Hydraulic Jump. Derive the expression for depth of Hydraulic Jump. (16)

19. (a) Describe the functions of various main components of Pelton Turbine with neat sketches. (16)

Or

(b) A pelton wheel has a mean bucket speed of 10 m/sec with a jet of water flowing at the rate of 700 litres/s under a head of 30m. The buckets deflect the jet through an angle of 160°. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume co-efficient of velocity as 0.98. (16)

20. (a) A centrifugal pump is running at 1000rpm. The outlet vane angle of the impeller is 45° and velocity of flow at outlet is 2.5 m/s. The discharge through the pump is 200 litres/s when the pump is working against a total head of 20 m. If the manometric efficiency of the pump is 80%. Determine the diameter of the impeller and the width of the impeller at outlet. (16)

Or

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

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