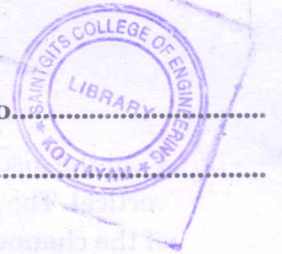


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(Pages : 2)

Reg. No.....

Name.....



B.TECH. DEGREE EXAMINATION, MAY 2015

Fourth Semester

Branch : Civil Engineering

CE 010 404—OPEN CHANNEL FLOW AND HYDRAULIC MACHINES (CE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. What are the conditions for the rectangular channel of the best section ?
2. Write the application of Pitot tube.
3. Brief initial depth and sequent depth for hydraulic jump.
4. Differentiate radial and axial flow turbine.
5. Write a note on air lift pump.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. State the critical flow condition in five different ways.
7. Explain the various assumptions made in gradually varied flow.
8. Explain the term hydraulic jump with neat sketch.
9. Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of jet.
10. Explain multistage pump.

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each question carries 12 marks.

11. A rectangular channel of width 4 m is having a bed slope of 1 in 1500. Find the discharge through the channel. Take $C = 50$.

Or

Turn over

12. Find the discharge through a trapezoidal channel of width 8 m and side slope of 1 horizontal to 3 vertical. The depth of flow water is 2.4 m and value of Chezy's constant $C = 50$. The slope of the bed of the channel is given 1 in 4000.
13. Find the slope of the free water surface in a rectangular channel of width 20 m having a depth of flow 5 m. The discharge through the channel is $50 \text{ m}^3/\text{s}$. The bed of the channel is having a slope of 1 in 4000. Take the value of Chezy's constant $C = 60$.

Or

14. Explain different methods to measure the discharge through open channels.
15. The depth of flow of water, at a certain section of a rectangular channel of 2m wide, is 0.3 m. The discharge through the channel is $1.5 \text{ m}^3/\text{s}$. Determine whether a hydraulic jump will occur, and if so, find its height and loss of energy per kilogramme of water.

Or

16. A hydraulic jump forms at the down stream end of spill way carrying $17.93 \text{ m}^3/\text{s}$ discharge. If the depth before jump is 0.80 m, determine the depth after the jump and energy loss.
17. A jet of water moving at 10 m/s impinges on a concave shaped vane to deflect the jet through 120 degrees when stationary. If the vane is moving at 6 m/s, find the angle of jet so that there is no shock at the inlet. Make suitable assumptions.

Or

18. Differentiate between :
- (a) Impulse and reaction turbines.
 - (b) Radial and axial flow turbines.
19. A single acting reciprocating pump running at 50 r.p.m. delivers $0.01 \text{ m}^3/\text{s}$ of water. If the diameter of piston is 200 mm and stroke length 400 mm. Determine :
- (a) The theoretical discharge ;
 - (b) Cd of pump ; and
 - (c) Slip and percentage of slip.

Or

20. A centrifugal pump delivers water against a net head of 14.5 metres and a design speed of 1000 r.p.m. The impeller diameter is 300 mm and outlet width 50 mm. Determine the discharge of the pump if the manometric efficiency is 0.95. Take vane angle $\phi = 30^\circ$.

(5 × 12 = 60 marks)

