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Question Paper Code : 21202

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Fourth Semester

Civil Engineering

CE 2253/CE 44/CE 1253 A/10111 CE 404/080100020 — APPLIED
HYDRAULICS ENGINEERING

(Regulation 2008 / 2010)

(Common to PTCE 2253 — Applied Hydraulics Engineering for B.E. (Part-time)
Fourth Semester – Civil Engineering – Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a prismatic channel?
2. Draw a neat sketch of the velocity distribution in trapezoidal channel.
3. What are the factors affecting Manning's roughness Coefficient?
4. What is economical section? State conditions for a trapezoidal channel.
5. What are the uses of formation of hydraulic jump in a channel?
6. What is the cause of surge to occur in a flow?
7. Define negative slip.
8. Write a short notes on Indicator diagram.
9. Give examples of reaction turbine
10. What are the uses of draft tube?

PART B — (5 × 16 = 80 marks)

11. (a) Explain with neat sketches about different types of open channel flow. (16)

Or

- (b) Water flows at rate of 20 cumecs in a rectangular channel 14 m wide at a velocity of 1.8 m/s. Determine the specific energy of the flowing water, critical velocity and minimum specific energy corresponding to this discharge, the Froude number and state whether the flow is subcritical or supercritical. (16)

12. (a) A trapezoidal channel With side slopes 1 : 1 has to be designed to convey $15 \text{ m}^3/\text{sec}$ at a velocity of $3 \text{ m}/\text{sec}$ so that the amount of concrete lining for the bed and sides is the minimum. Calculate the area of lining required for one metre length of channel. (16)

Or

- (b) (i) How the stream discharge is measured by chemical method? Explain. (8)
- (ii) Derive Chezy's formula to determine the velocity of flow in open channel. (8)
13. (a) (i) Explain how the profiles are classified. (8)
- (ii) What are the various types of surges? Explain. (8)

Or

- (b) (i) Derive an expression for loss of head in Hydraulic Jump. (8)
- (ii) How the discharge measurement done using Standing wave flume without hump? (8)
14. (a) (i) Derive an expression for the Euler's Head developed by a rotodynamic hydraulic machine. (8)
- (ii) What are the various applications of momentum principle? Explain. (8)

Or

- (b) (i) What are the various types of turbines? Explain. (8)
- (ii) What are the various types of draft tubes? Explain (8)
15. (a) (i) What is the necessity of using multistage centrifugal pumps? Explain. (8)
- (ii) Explain the working principle of submergible pump with neat sketch. (8)

Or

- (b) A Pelton wheel operates with a jet of 200 mm diameter under the head of 600 m . Its mean runner diameter 2.50 m and it run with a speed of 400 rpm . The outlet bucket tip angle is 15° , velocity coefficient is 0.99 , mechanical losses equal to 4% of supplied power and relative velocity reduction of water while passing through bucket is 20% . Determine the forces of jet on the bucket, the power developed, efficiency of bucket and overall efficiency. (16)