Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 11186

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2012.

Fourth Semester

Civil Engineering

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

(Regulation 2008)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define hydraulic mean depth.

2. Define specific energy.

3. Define uniform flow in channels.

4. What are non-erodible channels?

5. Define transition depth.

6. What are surges?

7. What are the types of casing in centrifugal pump?

8. Define negative slip.

9. What is radial flow turbine?

10. What is overall efficiency in turbines?

PART B — (5 × 16 = 80 marks)

11. (a) In flow through a rectangular channel for a certain discharge the Froude's number corresponding to two alternate depths of F_1 and F_2 Show that $(F_2/F_1)= (2+F_2^2)/(2+F_1^2)$.

Or

(b) Derive the geometrical properties of a most economical triangular channel section.

12. (a) Derive the Chezy's formula for discharge through channel. Write the formulas to find out the Constant C.

Or

(b) A trapezoidal channel is 8 m wide at bed and the depth of flow as 2 m. the bed fall is 0.5 m per km. The side slopes are 1 : 1 taking Bazin's constant as 2.35, find the discharge through the channel.

13. (a) Derive the dynamic equation of gradually varied flow. Write the assumptions made in it.

Or

(b) Define hydraulic jump. What are its types? How the energy dissipated? Explain in detail.

14. (a) Explain with a neat sketch, the construction details and working principles of a centrifugal pump.

Or

(b) Explain with a neat sketch, the construction details and working principles of a reciprocating pump.

15. (a) A Kaplan turbine runner is to be designed to develop 9100 kW. The net available head is 5.6 m. If the speed ratio = 2.09, flow ratio = 0.68, overall efficiency 86% and the diameter of the boss is 1/3 the diameter of the runner. Find the diameter of the runner, its speed and the specific speed of the turbine.

Or

(b) (i) Explain in detail about the main parts of Pelton wheel turbine. (8)

(ii) A Pelton wheel is having a mean bucket diameter of 1 m and is running at 1000 rpm. The net head on the Pelton wheel is 700 m. If the side clearance angle is 15° and discharge through nozzle is 0.1 m³/s, find : (1) Power available at the nozzle and (2) hydraulic efficiency of the turbine. (8)

2

11186