Reg. No. : | E | N | G | G | T | R | E | E | . | C | O | M |

Question Paper Code : 50534

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Fourth Semester

Civil Engineering

CE 3401 — APPLIED HYDRAULICS ENGINEERING

(Regulations 2021)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Froude Number.
2. State the application of Manning's formula.
3. List the classification of flow profile.
4. Define afflux.
5. What is meant by Standing wave?
6. List the assumptions made in deriving an expression for the depth of hydraulic jump.
7. Give the working principle of Impulse turbine.
8. List out the applications of draft tube.
9. Give an abbreviation of NPSH and its application.
10. Define Negative slip.

PART B — (5 × 13 = 65 marks)

11. (a) Calculate the bottom slope and conveyance 'K' of a rectangular flume of width 500 mm and depth of flow 300 mm having adjustable bottom slope with a flow of 100 lps. Take Chezy's constant as 56.

Or

(b) Explain the classification of flow in open channels with a neat sketches.

12. (a) Explain the procedure for flow profiles determination by standard step method.

Or

(b) Calculate the following given below for a rectangular channel of width 7 m and depth of water 1.1 m, having a flow of 12 m^3/s.

(i) Specific energy of a flowing water (5)

(ii) Critical depth and Critical Velocity (4)

(iii) Value of minimum of specific energy. (4)

13. (a) Discuss the types of hydraulic jump with a suitable sketch and mention their applications.

Or

(b) Discuss the application of momentum equation for rapidly varied flow.

14. (a) Discuss in detail the various types of efficiencies of a turbine.

Or

(b) Compute the diameter of Pelton turbine and jet which develops 3000 kW under a head of 300 m having an overall efficiency of 83%, speed ratio = 0.46, coefficient of velocity (C_v) = 0.98, and specific speed (N) = 16.5.

15. (a) Illustrate the characteristics curves of Centrifugal pumps with a neat sketch and its purpose. (13)

Or

(b) Explain the parts and the working principle of a reciprocating pump with a neat sketch.

PART C — (1 × 15 = 15 marks)

16. (a) Compute the power output of a three stage Centrifugal pump running at 1000 rpm delivering a discharge of 30 lps having an impeller of 30 cm diameter, 2 cm wide at outlet with vanes curved back at the outlet at 45° and reduce the circumferential area by 10%. Take manometric efficiency as 90% and overall efficiency as 75%.

Or

(b) Illustrate the process of cavitation with its effect and precautionary measures. Also discuss cavitation in turbines. (15)

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