

C 59287

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Name.....

Reg. No.....

**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION  
JUNE 2009**

**CE 04 506—OPEN CHANNEL HYDRAULICS AND HYDRAULIC MACHINERY**

(2004 admissions)

Time : Three Hours

Maximum : 100 Marks

**Part A**

1. What is meant by normal depth in a channel ? How do you compute the same for trapezoidal channel ?
2. Write a note on specific force, specific energy and alternate depths of flow.
3. Compare and contrast Gradually varied flow and Rapidly varied flow.
4. Write a note on prismatic channels.
5. Explain with a neat sketch the occurrence and importance of hydraulic jump.
6. Explain about surges.
7. With a neat sketch explain the working principle of Pelton Turbine.
8. Distinguish between Rotodynamic pumps and Positive displacement pumps.

(8 × 5 = 40 marks)

**Part B**

- II. (a) (i) Explain the importance of channel transition. (7 marks)
- (ii) A concrete lined canal is to be designed to carry a discharge of  $100 \text{ m}^3/\text{s}$ ., although the discharge during some periods may be as low as  $20 \text{ m}^3/\text{s}$ . Design the section and the bed slope such that the Froude number is nearly 0.5 for the entire discharge range.

(8 marks)

Or

- (b) (i) Briefly explain the computation of uniform flow using Manning's and Chezy's method. (8 marks)
- (ii) A rectangular channel carries  $5.66 \text{ m}^3/\text{s}$ . Find the critical depth  $h_c$  and critical velocity  $V_c$  for (a) a width of 3.66 m and (b) a width of 2.74 m ; (c) what slope will produce the critical velocity in (a) if  $n = 0.020$  ?

(7 marks)

- III. (a) (i) Briefly explain the stage discharge for the determination of discharge in a stream. (8 marks)
- (ii) How do you compute length of back water curve for a non-uniform flow ? (7 marks)

Or

**Turn over**

(b) (i) Sketch the following surface profiles for the following situations :—

- (1) Mild slope followed by a milder slope and a steep slope.
- (2) Mild slope followed by a short horizontal channel and a steep slope.
- (3) Steep slope followed by a critical slope and a mild slope.

(6 marks)

(ii) Explain the different methods of determination of velocity of stream flow. (9 marks)

IV. (a) Discuss the various characteristics of hydraulic jump such as energy loss, efficiency and height of the jump. (15 marks)

Or

(b) Discuss in detail about the following statement. "Jump as energy dissipater". (15 marks)

V. (a) (i) A single acting reciprocating pump having a cylinder diameter of 150 mm and stroke of 300 mm is used to raise the water through a height of 20 m. Its crank rotates at 60 r.p.m. Find the theoretical power required to run the pump and the theoretical discharge. If actual discharge is 5 lit/s, find the percentage of slip. If delivery pipe is 100 mm in diameter and is 15 m long, find the acceleration head at the beginning of the stroke. (9 marks)

(ii) Write a note on working of submersible pump. (6 marks)

Or

(b) (i) Derive the equation for power and work done for the impact of jets on moving curved vanes. (9 marks)

(ii) Write a note on working of Jet pump. (6 marks)

[4 × 15 = 60 marks]