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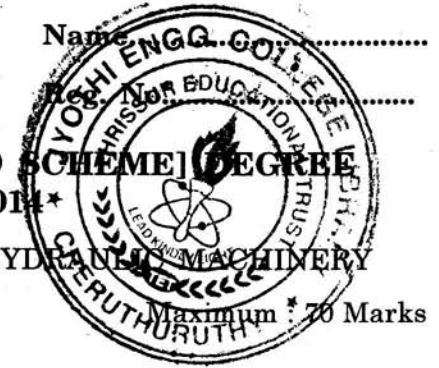
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Name .....

**FIFTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE  
EXAMINATION, NOVEMBER 2014**

CE/PTCE 09 503—OPEN CHANNEL HYDRAULICS AND HYDRAULIC MACHINERY

Time : Three Hours



*Assume any missing data suitably.*

**Part A**

*Answer all questions.*

*Each question carries 2 marks.*

1. (a) Explain the term conveyance.  
(b) Write a short note on transitions in rectangular channel.  
(c) What is meant by gradually varied flow ?  
(d) Define hydraulic jump.  
(e) List out the various losses that occur during the operation of a pump.

(5 × 2 = 10 marks)

**Part B**

*Answer any four questions.*

*Each question carries 5 marks.*

2. Write a short note on stream flow measurements.
3. An irrigation channel of trapezoidal section having side slopes 3 horizontal to 2 vertical, is to carry a flow of 10 m<sup>3</sup>/s on a longitudinal slope of 1 in 5000. The channel is to be lined for which the value of friction coefficient in Manning's formula is  $n = 0.012$ . Find the dimensions of the most economical section of the channel.
4. In a rectangular channel 3.5 m. wide laid at a slope of 0.036, uniform flow occurs at a depth of 2 m. Find how high can the hump be raised without causing afflux ? If the upstream depth of flow is to be raised to 2.5 m., what should be the height of the jump ? Take Manning's  $n$  equal to 0.015.
5. List out and explain the various types of hydraulic jumps.
6. Write short notes on :
  - (a) Penstocks.
  - (b) Surge tanks.
7. Write down the expression for the work done and hydraulic efficiency for (a) Pelton wheel ;  
(b) Francis turbine.

(4 × 5 = 20 marks)

**Turn over**

**Part C**

*Answer all questions.*

*Each question carries 10 marks.*

8. Write short notes on :

- (a) Specific force and specific energy.
- (b) Metering flumes.

*Or*

A flow of 100 litres per second flows down in rectangular laboratory flume of width 0.60 m. and having adjustable bottom slope. If Chezy's constant  $C$  is 56, determine the bottom slope necessary for uniform flow with a depth of flow 0.30 m. Also find the conveyance.

9. Derive an expression for the dynamic equation for the gradually varied flow from the basic energy equation by clearly stating the basic assumptions.

*Or*

Write a short note on the various characteristics of flow profiles in prismatic channels.

10. A horizontal rectangular channel 4 m. wide carries a discharge of  $16 \text{ m}^3/\text{s}$ . Determine whether a jump may occur at an initial depth of 0.5 m. or not. If a jump occurs, determine the sequent depth corresponding to this initial depth. Also determine the energy loss in the jump.

*Or*

Write short notes on :

- (a) Practical application of hydraulic jump.
- (b) Surges in open channels.

11. A Pelton wheel develops 5520 kW under a head of 240 m. at an overall efficiency of 80 % when revolving at a speed of 200 r.p.m. Find the unit discharge, unit power and unit speed. Assume peripheral coefficient = 0.46. If the head on the same turbine falls during the summer season to 150 m., find the discharge, power and speed for this head.

*Or*

Derive an expression for the force exerted by a fluid jet on stationary curved vane. (Jet striking a symmetrical stationary curved vane at the centre).

(4 × 10 = 40 marks)