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BICE-025

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

June, 2015

00576

BICE-025 : HYDRAULICS AND HYDRAULIC MACHINES

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any **seven** questions. Answers are to be written in English only. Assume missing data, if any. Use of calculator is permitted.*

1. (a) Describe the following terms using the mathematical expression : *4*

(i) Steady flow

(ii) Unsteady flow

(iii) Uniform flow

(iv) Non-uniform flow

(b) Derive the expression for the discharge through open channel by Chezy's formula. *6*

2. Find the slope of the bed of a rectangular channel of width 5 m, when depth of water is 2 m and rate of flow is given as 20 m^3/sec. Take Chezy's Constant C = 50. *10*

3. Find the bed slope of trapezoidal channel of bed width 6 m, depth of water 3 m and side slope of 3 horizontal to 4 vertical, when the discharge through the channel is 30 m^3/sec. *10*

4. (a) What is the condition for the most economical rectangular channel ? *2*

   (b) A rectangular channel carries water at the rate of 400 litres/sec, when bed slope is 1 in 2,000. Find the most economical dimension of the channel, if C = 50. *8*

5. (a) What do you understand by specific energy curve ? *3*

   (b) Derive the expression of minimum specific energy in terms of critical depth. *7*

6. The discharge of water through a rectangular channel of width 8 m, is 15 m^3/sec, when depth of flow of water is 1·2 m.

   Calculate

   (a) Specific energy of the flowing water

   (b) Critical depth and critical velocity *4*

   (c) Value of minimum specific energy *2*

7. (a) For deriving the expression for depth of hydraulic jump in open channel flow, what are the general assumptions made ? *4*

(b) A sluice gate discharges water into a horizontal rectangular channel with a velocity of 10 m/sec. and depth of flow of 1 m. Determine the depth of flow after the jump and consequent loss in total head. *6*

8. Write short notes on the following : *10*

(a) Pelton Turbine

(b) Tangential Flow Turbine

(c) Overall Efficiency of a Turbine

9. A Pelton wheel is having a mean bucket diameter of 1 m and is running at 1,000 r.p.m. The net head on the Pelton wheel is 700 m. If the side clearance angle is 15° and discharge through nozzle is 0·1 m^3/sec, find the

(a) Power available at the nozzle, *5*

(b) Hydraulic efficiency of the turbine. *5*