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BICE-025

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

December, 2015

BICE-025 : HYDRAULICS AND HYDRAULIC MACHINES

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. Differentiate between Francis and Kaplan turbines, using relevant sketches. *10*

2. A Kaplan turbine working under a head of 56 m develops 10 MW. The hub diameter of the runner is 0·35 times the outer diameter. The speed ratio and flow ratio is 2·1 and 0·67, respectively. If the overall efficiency is 85%, find out the diameter of the runner and the speed of the turbine. *10*

3. What do you understand by characteristic curves ? Explain, briefly, any two types of characteristic curves. *10*

4. Describe, in detail, the classification of channels based on channel characteristics. *10*

5. (a) Write a short note on Pelton Turbines. *3*

(b) Calculate the specific energy and Froude number of water flowing in a rectangular channel of width 6 m, if it conveys 12 m^3/s of water with a depth of flow of 1 m. Also find the minimum specific energy and critical depth. *7*

6. Find the bed slope in channels of rectangular and triangular sections having top width 5 m and uniform depth of 2 m, if the discharge is 0·03 m^3/s. Take the value of Chezy's constant as 60. *10*

7. Derive the conditions required for the most efficient rectangular section. *10*

8. A rectangular section of width 5 m conveys water at the rate of 15 m^3/s. State whether hydraulic jump occurs, if the flow velocity is 5 m/s. If hydraulic jump occurs, what is its height and strength ? Estimate the flow velocity and Froude number after the jump and the loss of energy in the jump per kg of water. Also calculate the power dissipated in the jump. *10*

9. Write short notes on the following : *4+3+3=10*

(a) Cavitation

(b) Celerity of the gravity wave

(c) Surge