

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

June, 2017

00934

**BICE-025 : HYDRAULICS AND HYDRAULIC
MACHINES**

Time : 3 hours

Maximum Marks : 70

*Note : Attempt any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted. Assume missing data, if any.*

-
-
1. (a) What do you understand by the most economical section of channels ? What are the conditions for the most economical sections for rectangular, trapezoidal and circular sections ? 4+5
 - (b) Describe the various geometrical parameters of channels. 5
 2. (a) Describe critical depth and critical velocity with the help of relevant mathematical equations. 6
 - (b) Find the diameter of a circular sewer which is laid at a slope of 1 in 8000 and carries a discharge of 800 litres/sec when flowing half-full. Assume Manning's $n = 0.020$. 8

3. (a) A rectangular channel of width 8 m discharges water at a rate of $15 \text{ m}^3/\text{s}$, when the depth of flow is 1.2 m. Calculate
- specific energy of water,
 - critical depth and critical velocity, and
 - minimum specific energy. 3+4+3
- (b) Define hydraulic jump. Give the equation for loss of energy due to it. 4
4. Describe, in detail, the classification of turbines. Also give neat sketches. 14
5. Discuss the different types of characteristic curves of turbines with the help of diagrams. 14
6. A Kaplan turbine develops 24647.6 kW power at an average head of 39 m. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and an overall efficiency of 90%, calculate its diameter, speed and specific speed. 14
7. Write short notes on the following : $4 \times 3 \frac{1}{2} = 14$
- Similarity Laws
 - Water Hammer
 - Manometric Head
 - Cavitation
-