**BICE-025**

# B.Tech. CIVIL ENGINEERING (BTCLEVI)
## Term-End Examination
## December, 2018

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## 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. Assume missing data, if any.*

1. (a)   What do you understand by "Flow in open channel" ? Explain.   5

   (b)   Differentiate between the following :   5
      (i)   Uniform flow and Non-uniform flow
      (ii)  Rapidly varied flow and Gradually varied flow

2. What is a specific energy curve ? Derive an expression for critical depth and critical velocity.   *10*

3. A rectangular channel 6 m wide carries a discharge of 5 $m^3$/s at a slope of 0·006. Compute the normal depth and maximum shear on the bed. Take Manning's n = 0·014.   *10*

**4.** Determine the most economical section of a trapezoidal channel with side slope 2 H : 1 V, carrying a discharge of 11·5 m$^3$/s with a velocity of 0·75 m/s. What should be the bed slope of the channel ? Take n = 0·025. *10*

**5.** Show the following relationship in GVF in frictionless rectangular channel : *10*

$$x = \left(\frac{y}{s_b}\right)\left[1 + \frac{1}{2}\left(\frac{y_c}{y}\right)^3\right] + \text{constant}.$$

**6.** A rectangular channel 9 m wide discharges water at normal depth 3·65 m. The bed slope is 1 in 4000 and Manning's n = 0·017. A dam placed downstream raises the level to a height of the profile to 6·8 m immediately behind the dam. Determine the length of the profile by single step. *10*

**7.** Find an expression for loss of energy head for a hydraulic jump. *10*

**8.** The depth of flow of water, at a certain section of a rectangular channel 4 m wide, is 0·5 m. The discharge through the channel is 16 m$^3$/sec. If a hydraulic jump takes place on the downstream side, find the depth of flow after the jump. *10*

**9.** Define specific speed of the turbine. Derive an expression for specific speed. What are unit quantities ? *10*

**10.** Define the following terms : $4 \times 2\frac{1}{2} = 10$

(a) Speed ratio in reference to hydraulic M/C

(b) Draft tube in reference to hydraulic M/C

(c) Open Channel Flow

(d) Celerity