

B.Tech. Civil (Construction Management)

Term-End Examination

June, 2018

00703

ET-540(B) : FLOW IN OPEN CHANNEL

Time : 3 hours

Maximum Marks : 70

*Note : Answer any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted. Assume suitable data, if not given.*

1. (a) Draw neat sketches to show the hydraulic grade line and energy for pipe flow and open channel flow. 5
- (b) Differentiate between the following : 3×3=9
 - (i) Uniform flow and Varied flow
 - (ii) Steady flow and Unsteady flow
 - (iii) Laminar flow and Turbulent flow
2. (a) With the help of neat sketches, show the effect of bed curvature on hydrostatic pressure distribution in an open channel. 6
- (b) A trapezoidal channel has a bottom width of 3 m, side slope of 1.5 : 1, longitudinal slope of 0.0016 and an estimated value of $n = 0.13$. Determine the normal depth of flow for a discharge of $7.5 \text{ m}^3/\text{s}$. 8

3. (a) Describe the application of specific energy principle to solve the transition problem in an open channel. 7
- (b) Calculate the critical depth and corresponding specific energy for a discharge of $6.0 \text{ m}^3/\text{s}$ in a rectangular channel having bottom width of 2.0 m . 7
4. (a) What do you understand by hydraulic jump ? Write the applications of hydraulic jump. 7
- (b) The discharge in a 1.2 m wide horizontal rectangular channel is $0.14 \text{ m}^3/\text{s}$. Determine whether a well defined and free jump will be formed if sequent depths are $y_1 = 0.018 \text{ m}$ and $y_2 = 0.39 \text{ m}$. 7
5. (a) With the help of neat sketches, discuss the M-profiles and S-profiles of water surface in open channels. 9
- (b) A long rectangular channel of 15.5 width and a bed slope of 0.0001 , connects two reservoirs of water. If depth of water at the upstream reservoir is 1.6 m and at the downstream reservoir it is maintained at 2.1 m , what type of water surface profile is expected to form in the channel ? Take $n = 0.016$. 5
6. (a) With the help of neat sketches, discuss the water surface profiles below a sluice for the given conditions : 7
- (i) Mild channel
- (ii) Steep channel

(b) Recognise and draw the flow profiles for the following cases of flow situations : 7

- (i) A mild channel breaking into a steep channel
- (ii) An adverse channel discharging into a mild channel

7. Write short notes on any **four** of the following : $4 \times 3 \frac{1}{2} = 14$

- (a) Hydraulic Exponent for Uniform-Flow Computation
 - (b) Control Section
 - (c) Location of a Jump in Mild Channel
 - (d) Difference between Hydraulic Radius and Hydraulic Depth
 - (e) Relationship between Chezy's 'C' and Manning's 'n'
-