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ET-540(B)

B.Tech. Civil (Construction Management)

Term-End Examination

00307 **December, 2017**

ET-540(B) : FLOW IN OPEN CHANNEL

Time : 3 hours *Maximum Marks : 70*

Note : *Solve any **five** questions. All questions carry equal marks. Neat and labelled sketches must be given, if required. Use of scientific calculator is permitted.*

1. (a) Define Channel Bed and Channel Roughness. How do these influence the flow ? Explain. *3*

(b) Define Wide and Narrow channels. *2*

(c) Draw typical isovels (equal velocity) in rectangular, trapezoidal and circular channels. *4*

(d) What are Velocity and Momentum coefficients ? *3*

(e) What do you understand by the state of flow ? Explain. *2*

2. (a) A triangular channel (central angle = 60°) has a bed slope of 0·0017, and n = 0·016. Determine the normal depth of flow for $Q = 60\ m^3/s$. *8*

(b) Explain how a critical flow is different from a normal flow under certain conditions. When do the two flows refer to the same flow ? *6*

3. (a) What is Specific Energy ? Draw a typical E-y curve and explain its shape. Prove mathematically that its two branches are asymptotic to $E = y_c$ and $y = 0$ line. *9*

(b) Differentiate between alternate and conjugate depths. *5*

4. (a) Derive an equation connecting conjugate depths and F_1 in a horizontal, rectangular channel. *9*

(b) How is a wide channel different from a normal-width channel ? *1*

(c) Why do we use average values of velocity and depth in an open channel computation ? *4*

5. (a) Find the slope of the water surface at a location on an open channel, if S_0 = 1 in 1000; S_f = 1 in 1200 and α = 1·1. Take Froude number = 0·1. *11*

(b) When the slope of the water surface in a G.V.F tends to infinity, what conclusion is directly drawn ? Explain. *3*

6. Discuss briefly with proper sketches, the performance of a long canal connecting two reservoirs under various upstream and downstream conditions. *14*

7. Explain the procedure of computing G.V.F. water surface profiles using step-by-step method. Give the format of the table used. *14*

8. Write notes on any ***two*** of the following : *2×7=14*

   (a) Geometric Elements of an Open Channel

   (b) Computation of Critical Depth

   (c) Characteristics of Critical Flow

   (d) Application of Momentum Equation