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ET-540(B)

B.Tech. Civil (Construction Management)

Term-End Examination

00005 **December, 2014**

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 calculator is permitted.*

1. (a) What do you understand by (i) steady and unsteady flow (ii) uniform and non-uniform flow ? 7

(b) What are the empirical formulae for determining the value of Chezy's constant ? 7

2. (a) Derive the dimensions of Manning's roughness coefficient 'n'. 4

(b) Water flows at a uniform depth of 2 m in a trapezoidal channel having bottom width 6 m, side slopes 1 V : 2 H. If it has to carry a discharge of 65 $\frac{m^3}{s}$, compute bottom slope required to be provided. Take Manning's n = 0·025. 10

3. A rectangular channel 2·5 m wide carries 6·0 m^3/s of flow at a depth of 0·50 m. Calculate the height of hump required to be placed at a section to cause critical flow. The energy loss due to the obstruction by hump can be taken as 0·1 times the upstream velocity head. *14*

4. (a) Explain hydraulic jump in brief. *4*

(b) The depth of the flow of water at a certain section of a rectangular channel 3 m wide is 0·25 m. The discharge through a channel is $1{\cdot}8\frac{m^3}{s}$. Determine whether a hydraulic jump will occur and if so find the height and loss of energy of the jump. *10*

5. State and discuss the assumptions made in the derivation of dynamic equation for Gradually Varied Flow (GVF). Derive the equation of the slope of water surface in GVF with respect to (i) channel bed, (ii) horizontal. *14*

6. Show that for a trapezoidal channel of given flow area, the condition for most economical channel requires that hydraulic mean radius is equal to one-half the depth of flow. *14*

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

(i) Types of flow in open channel

(ii) S_1, S_2 and S_3 profile in an open channel

(iii) Control section

(iv) Method of direct integration by Bresse method

(v) Energy loss in hydraulic jump

(vi) Specific Energy Curve