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ET-540(B)

B.Tech. Civil (Construction Management)

Term-End Examination

00387 **June, 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) State the conditions under which the rectangular section of an open channel will be most economical. Derive these conditions. 7

(b) Find the discharge through a rectangular channel 14 m wide, having depth of water 3 m and bed slope 1 in 1500 using Kutter's formula. Take the value of N = 0·03 in Kutter's formula. 7

2. The discharge of water through a rectangular channel of width 8 m, is 15 m^3/s when depth of flow is 1·2 m. Calculate :

(i) Specific energy of flow

(ii) Critical depth and critical velocity

(iii) Value of minimum specific energy 14

3. Explain hydraulic jump. Derive an expression for the depth of hydraulic jump in terms of the upstream Froude Number. *14*

4. Derive the dynamic equation for gradually varied flow in an open channel as follows : *14*

$$\left(\frac{dy}{dx}\right) = \frac{S_o - S_f}{1 - \left(\frac{v^2}{gy}\right)}$$

5. What is the difference between gradually varied flow and rapidly varied flow ? Illustrate with neatly drawn sketches. *14*

6. A rectangular channel carrying a supercritical flow is to be provided with a hydraulic jump type of energy dissipator. It is desired to have an energy loss of 5·0 m in the jump when the inlet Froude Number is 8·5. Determine the sequent depths. *14*

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

(i) Velocity distribution in open channel

(ii) Specific energy curve

(iii) M_1, M_2 and M_3 surface profiles

(iv) Q-constant curve

(v) Hydraulic exponents

(vi) Transitions in open channel
