ET-533(B)

B.Tech. Civil (Water Resources Engineering)
Term-End Examination

00736   **June, 2015**

ET-533(B) : OPEN CHANNEL FLOW

Time : 3 hours   *Maximum Marks : 70*

*Note : Attempt any **five** questions. All questions carry equal marks. Neat and well-labelled sketches are to be given where necessary. Use of calculators is permitted.*

1. (a) Explain velocity distribution in a Rectangular Channel. Also draw typical curves of equal velocity in various channel sections.   *6*

    (b) Water flows in a rectangular channel 2·5 m wide at a velocity of 2·8 m/s and a depth of 2·2 m. There is an upward step of 0·72 m in the channel bed. What expansion in width must take place simultaneously for this flow to be possible as specified ?   *8*

2. Describe the computation of water surface profile by the following methods :   *14*

    (a) Graphical Integration Method

    (b) Direct Integration Method

3. (a) A discharge of 15 m³/s flows with a depth of 1·5 m in a rectangular channel 5 m wide. At a downstream section the width is reduced to 4·5 m and the channel bed raised by Δz. What will be the state of water surface elevations in the transitions when

(i) $\Delta z = 0 \cdot 10$ m and

(ii) $\Delta z = 0 \cdot 30$ m ?   *10*

(b) What are the important metering flumes ? Explain any one of them.   *4*

4. (a) What is Hydraulic jump ? What are its applications ? Explain sequent depths.   *6*

(b) Design a slotted roller bucket type energy dissipater with reference to the following data, as applicable to a given spillway :

Total discharge = 1060 m³/s

Width of bucket = 66·25 m

Maximum reservoir pool level in the reservoir = 242·50 m

Crest level of spillway = 234 m

Maximum tail water level = 225 m   *8*

5. (a) Explain the constancy of a wave period and classify water waves according to relative depth.   *6*

(b) A train of waves of period 10 seconds, is approaching the coast from deep waters. Calculate the wave length in this deep water, as well as in 10 cm depth and 5 m depth of this water body. What are the corresponding phase velocities ?   *8*

6. (a) List the assumptions and derive the dynamic equation of uniformly progressive flow. *10*

(b) Describe the wave profile of uniformly progressive flow. *4*

7. Explain, with a neat sketch, Hydraulic jump type stilling basin with horizontal apron. *14*

8. (a) Write short notes on Resistance diagram and its applications. *6*

(b) Explain the concept of specific momentum or specific force. *8*