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RN-6741

Third Year B. E. (Sem. V) (Civil) Examination

May / June – 2010

Hydrology & Open Channel Hydraulics

Time : Hours] [Total Marks :

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **Third Year B. E. (Sem. 5) (Civil)**

Name of the Subject :

☛ **Hydrology & Open Channel Hydraulics**

☛Subject Code No. : **6 7 4 1** ☛Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Figures on the right indicate full marks.
(3) Use of programmable computer is not allowed.
(4) Assume data where necessary.
(5) Use **separate** answer book for each section.

SECTION - I

1 (a) Discuss the scope of hydrology to water resources engineers. Define hydrologic equation. **6**

(b) What are the types of precipitation. Explain in brief. **6**

(c) The rate of rainfall for successive 20 minutes period of 120 minutes duration storm are 2.0, 2.0, 8.0, 5.0. 1/2 and 4 cm/hr. Taking the value of ϕ index as 3.1 cm/hr estimate the net runoff (surface runoff). Also determine the value of W-index. **5**

2 Attempt any **two** : **9×2=18**

(i) Find out the ordinate of a storm hydrograph resulting from a 3 hr storm with rainfall of 2.0, 6.0 and 3.0 cm. during subsequent 3 hours intervals. The ordinate of unit hydrographs are

Time (Hrs)	3	6	9	12	15	18	21	24
Ordinate UH (Cumecs)	0	130	95	65	40	22	10	20

Assume an initial loss of 6mm, infiltration index of 2.5 mn/hr and base flow of 10 cumecs.

(ii) Classify tube well and explain any one with neat sketch.

(iii) Define permeability and hydraulic gradient. Derive Darcy's law of ground water velocity.

3 Write short notes on : **5×3=15**

(i) Factors affecting runoff
(ii) Floating rain gauge
(iii) Recharging of ground water
(iv) Intensity duration curve
(v) Assumption of unit hydrograph and its limitation.

SECTION - II

4 (a) Give classification of flow in channels. Write about each type of flow in detail. **8**

(b) Find the discharge through a trapezoidal channel of width 10m and side slope of 1 horizontal to 3 vertical. The depth of flow of water is 2.4 m and the value of Chezy's constant C=50. The slope of the bed of the channel is given as 1 in 4000. **7**

5 (a) Show that for most economical trapezoidal channel **10**
(i) Half of top width = one of the sloping sides of the channel
(ii) Hydraulic mean depth = half of the depth of flow.

(b) A trapezoidal channel with side slopes of 1 to 1 has to be designed to convey 15 m^3/S at a velocity of 2 m/s so that amount of concrete lining for the bed and sides is the minimum. Calculate the area of lining required for 1 m length of canal. **10**

OR

5 (a) Define specific energy and draw and explain specific energy curve in detail for non uniform flow in channel. **6**

(b) Derive the expression for minimum specific energy in terms of critical depth for non-uniform flow. **4**

(c) The discharge of water through a rectangular channel of width 8m is 15 m^3/S when the depth of flow water is 1.2 m. **10**
Calculate :
(i) Specific energy of the flowing water
(ii) Critical depth and critical velocity
(iii) Value of minimum specific energy
(iv) Maximum possible discharge.

6 Write short note on the following : (any three)
(i) Classification of channel slopes
(ii) Hydraulic jump
(iii) Backwater curves
(iv) Critical velocity
(v) Flood routing.