

Roll No.

24292

B. Tech 5th Semester (Civil Engg.)

Examination – December, 2011

HYDROLOGY

Paper : CE - 311 - F

Time : Three hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all. Question No. 1 is *compulsory* and attempt *one* question from each Section. All questions carry equal marks. Answer should be brief, with neat sketches & lucid. Assume missing data wheresoever necessary.

1. Complete the following statements appropriately by fill-in the blanks/short answers. $10 \times 2 = 20$

- (i) The percentage of earth covered by Ocean is
- (ii) What is the source of energy in hydrologic cycle ?
- (iii) Estimate the residence time of Global atmospheric moisture.
- (iv) Name the common forms of precipitation.
- (v) For formation of clouds & hence precipitations, name the main constituents of condensation.
- (vi) How will you convert the Point Rainfall Values at various stations into average value over a catchment ? Name the methods.
- (vii) Evapotranspiration is confined to
- (viii) The ISI stand pan evaporimeter has an average pan coefficient value of
- (ix) The measurement of discharge in a stream is known as
- (x) The water year in India starts from the first day of

SECTION – A

2. A small catchment area 150 hectares received 10 cm rainfall in 120 minutes due to a storm. At the outlet of the catchment, the stream draining the catchment was dry before storm and experienced a runoff lasting for 12 hours, with average discharge of $2.0 \text{ m}^3/\text{sec}$. It went dry afterwards.

$$15 + 5 = 20$$

- (a) What is the amount of water not available to run-off due to combined effect of Infiltration, evaporation and transpiration ?
- (b) What is the ratio of run-off to precipitation ? 20
3. (a) What are the main characteristics of precipitation in India ? Elucidate.
- (b) The normal annual rainfall at Station A, B, C and D in a basin are 80, 60, 70, 93 cm respectively. In the year 2010, Station D was inoperative and Stations A, B, C recorded 96, 75, 80 cm respectively, of rainfall. Estimate rainfall at Station D in 2010.

$$8 + 12 = 20$$

SECTION – B

4. (a) Distinguish between :

- (i) Infiltration capacity and Infiltration rate
- (ii) Actual and potential Evapotranspiration
- (iii) Depression storage and Interception
- (iv) Evaporation and Transpiration

(b) A canal is 80 km long and has an average width of 15m. If the evaporation measured in a class A pan is 0.5 cm / day, calculate the volume of water evaporated in a month of 30 days. $4 \times 4 + 4 = 20$

5. (a) Discuss the factors affecting the infiltration capacity of an area.

(b) The Infiltration capacity of soil in a small watershed was found to be 6 cm/hour before a rainfall event. After 8-hours, it was 1.2 cm / hour. If the total infiltration during 8 hours was 15 cm estimate the value of decay-coefficient K_h in Horton's infiltration capacity equation.

$$8 + 12 = 20$$

SECTION – C

6. (a) During a flood flow, the depth of water in a 10 m wide rectangular channel was found to be 3.0m and 2.9m at two Sections 200 m apart. The drop in the water surface elevation was found to be 12 cm. Assuming Manning's co-efficient to be 0.25, Estimate the flood discharge through the channel.

- (b) Explain the stream flow measurement by area velocity method. 12 + 8 = 20

7. (a) List the factors affecting the seasonal and annual runoff of a catchment. Describe briefly the interaction of factors listed.

- (b) Describe the factors affecting flood hydrograph, with neat diagrams. 10 + 10 = 20

SECTION – D

8. (a) Distinguish between the following :

(i) Influent and Effluent Streams

(ii) Aquifer and Aquitard

(iii) Unconfined Aquifer and a baby Aquifer

(iv) Water table and piezometric surface

(c) State Darcy's law.

(b) At a certain point in an unconfined aquifer of 3 square kilometer area, the water table was at an elevation of 102.00m. Due to natural recharge in a wet season, its level rose to 103.20 m. 1.5 Mm^3 of water was then Pumped out which brought water table at 101.20m. Assuming water table in entire surface to respond in similar way calculate specific yield and volume of recharge.

$$4 \times 2 + 10 = 20$$

9. (a) What do you understand by steady flow into a well ? Explain .

(b) A 30-cm well is drilled in unconfined aquifer of saturated depth 40m. After steadily pumping at the rate of 1500 lpm the drawdown in two observation wells 25m and 75m from main 30cm well, were found to be 3.5 m and 2 m respectively. Calculate the draw-down at main - well of 30cm.

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