

**B. Tech. 5th Semester (Civil) F. Scheme
Examination, December- 2017**

HYDROLOGY

Paper- CE-311-F

Time allowed : 3 hours]

[Maximum marks : 100

Note : Attempt five questions in all. Question No.1 is compulsory and attempt one question from each section. All questions carry equal marks.

1. Write short note on the following –

- (a) Forms of precipitations
- (b) Inglis formula
- (c) Unconfined aquifers
- (d) Depression storage
- (e) Hypsometric curve.

5×4=20

Section-A

2. (a) Define hydrology. What role does hydrology play in the water resource planning. 10
- (b) A small catchment area 130 hectares received a rainfall of 12 cm in 110 minutes due to a storm. At the outlet of the catchment, the stream draining the catchment was dry before the storm and experienced a runoff lasting for 10 hrs. with an

average discharge of $1.7\text{m}^3/\text{s}$. The stream was dry again after the runoff event. What is the amount of water which was not available to runoff? 10

3. (a) Explain different methods to determine mean precipitation over an area and presentation of rainfall data. 10
- (b) Explain a procedure for supplementing the missing rainfall data. 10

Section-B

4. (a) Describe the process of infiltration and factors affecting infiltration. 10
- (b) Explain procedure for filling Horton's infiltration equation for experimental data from a green plot. 10

5. A reservoir has an average area of 50km^2 over a year. The normal annual rainfall at the place is 120 cm and the evaporation is 240 cm. Assuming the land flooded by the reservoir has a runoff coefficient of 0.4, estimate the net annual increase or decrease in the stream flow as a result of reservoir 20

Section-C

6. The peak of flood hydrograph due to 3-h duration isolated storm in a catchment is $270\text{m}^3/\text{s}$. The total depth of

rainfall is 5.9 cm. Assuming an average infiltration loss of $0.3\text{cm}/\text{h}$ and a constant base flow of $20\text{m}^3/\text{s}$. Estimate the peak of 3-h unit hydrograph. If the area of catchment is 567km^2 . Calculate base width of 3-h unit hydrograph by assuming it to be triangular in shape. 20

7. (a) Explain the stream flow measurement by area velocity method. 10
- (b) Describe the factors affecting the seasonal and annual runoff of a catchment. 10

Section-D

8. (a) Derive an equation for the steady state discharge from a well in an unconfined aquifer and depth of water table at two known position from the well. 12

- (b) Define Darcy's law. State all the assumptions involved in this law. 8

9. (a) Distinguish between specific capacity of a well and specific yield of an aquifer, 10

- (b) A 30 cm well completely penetrates an unconfined aquifer of saturated depth 40m. After a long period of pumping at a steady state of 1500 lpm, the drawdown in two observation well 25m and 75m from pumping well were found to be 3.5 and 2.0 m respectively. Calculate transmissivity of the aquifer. 10