

Seventh Semester B.E. Degree Examination, June/July 2019
Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define precipitation. Explain various forms of precipitation. (05 Marks)
b. Explain with a neat sketch, Symon's rain gauge. (06 Marks)
c. Rain gauge station 'X' did not function for a part of a month during which a storm occurred. The storm produced rain fall of 84, 70 and 96 mm at three surrounding stations A, B and C respectively. The normal annual rainfalls at the stations X, A, B and C are respectively 770, 882, 736 and 944 mm. Estimate the missing rainfall at station X. (05 Marks)

OR

- 2 a. Explain Horton's engineering representation of hydrologic cycle, with a neat sketch. (08 Marks)
b. Describe double mass curve techniques used to check consistency of rainfall data and adjust rainfall records. (08 Marks)

Module-2

- 3 a. Define evaporation, with a neat sketch, explain measurement of evaporation using ISI standard pan. (08 Marks)
b. Distinguish between the potential and actual evapotranspiration. (04 Marks)
c. Explain the factors affecting infiltration capacity. (04 Marks)

OR

- 4 a. Explain how the evapotranspiration can be estimated using the Blaney – Criddle method. (05 Marks)
b. With the neat sketch, explain double ring infiltrometer. (05 Marks)
c. A seven hour storm produced the following rainfall intensities (in mm/hr) at half an hour interval over a basin of area 1830 km².
4, 9, 20, 18, 13, 11, 12, 2, 8, 16, 17, 13, 6 and 1
If the corresponding observed run off is 36.6 million m³, estimate the ϕ – index for the storm. (06 Marks)

Module-3

- 5 a. Define runoff. Enlist the factors affecting runoff. (04 Marks)
b. Describe any two methods of separating the base flow from total runoff. (04 Marks)
c. The ordinates of 4h UH in m³/sec is given at a time interval of 2h after separating from the base flow :
0, 12.52, 21.32, 23.54, 17.84, 14.79, 12.18, 10.04,
8.26, 6.51, 4.98, 3.95, 3.05, 2.26, 1.60, 1.07, 0.53, 0
Derive the 8h unit hydrograph. (08 Marks)

OR

- 6 a. Define unit hydrograph. What are the assumptions underlying the unit hydrograph theory? How do they limit the applicability of unit hydrograph? (08 Marks)
- b. Given below are the ordinates of a 4h unit hydrograph of a basin in m^3/sec at one hour intervals :
- 4, 25, 44, 60, 70, 61, 52, 45, 38, 32, 27, 22, 18, 14, 11, 8, 6, 4, 2, 1
- Construct the s-curve hydrograph using the 4h UH. Hence derive the 2 hour unit hydrograph. Area of the basin is 195.84 km^2 . (08 Marks)

Module-4

- 7 a. Define the term irrigation. Briefly describe the factors which necessitate the irrigation. (04 Marks)
- b. Write a note on : flow and lift irrigation. (04 Marks)
- c. Explain in detail irrigation efficiency and add a note on crop seasons of India. (08 Marks)

OR

- 8 a. Define : duty, delta and base period. Derive the relationship between them. (05 Marks)
- b. Write a note on Bandhora irrigation. (03 Marks)
- c. A water course has culturable commanded area of 2600 hectares, out of which the intensities of irrigation for perennial sugar – cane and rice crops are 20% and 40% respectively. The duty for these crops at the head of water course are 750 hectares/cumes and 1800 hectares/cumes respectively. Find the discharge required at the head of water course if the peak demand is 120% of the average requirement. (08 Marks)

Module-5

- 9 a. Define canal. Explain different types of canal based on alignment. (08 Marks)
- b. What is meant by design of canal? Bring out the difference between Kennedy's and lacey's theory. (08 Marks)

OR

- 10 a. With a neat sketch, explain zones of storage in a reservoir. (08 Marks)
- b. A channel section has to be designed for the following data :
- Discharge $Q = 30$ cumes
- Silt factor $f = 1.00$
- Side slope = $\frac{1}{2} : 1$
- Find also the longitudinal slope. (08 Marks)