

B.E. (Civil Engineering) Semester Fifth (C.B.S.)
Hydrology and Water Resource (HWR)

P. Pages : 3

Time : Three Hours

**KNT/KW/16/7322**

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Diagrams and chemical equations should be given whenever necessary.
 11. Illustrate your answers whenever necessary with the help of neat sketches.
 12. Use of non programmable calculator is permitted.

1. a) Describe hydrology cycle. Explain with a neat sketch the various process involved in it. **8**
- b) State the precautions which should be followed while selecting a site for a rain gauge station. **6**

OR

2. a) Explain in brief the different types of precipitation according to the factors responsible for lifting of an air mass. **6**
- b) The annual rainfall depths recorded at existing 5 rain gauge stations in a drainage area or. **8**

Station	A	B	C	D	E
Annual rainfall (cm)	88	104	138	78	56

- i) What is the percentage accuracy of the existing rain gauge network in estimation of the rainfall over the basin?
- ii) If it is desired to estimate the rainfall over the basin with not less than 90% accuracy. Is there a need to install additional rain gauge ? If so, how many ?
3. a) What is infiltration ? What are the various factors which affects infiltration ? **6**
- b) Determine the net of run-off, total rainfall and w-index for the following data. **7**

Time of rain fall (min)	Total rainfall (cm/hr)
45	3.0
45	3.5
45	13.0
45	9.0
45	3.0

Index = 4.0 cm/hr.

OR

4. a) Explain the different methods adopted to reduce evaporation from a reservoir. **6**
- b) The average water spread area of runoff at a reservoir are given for 12 month The pan co-efficient can be assumed at 0.75 Determine the total Evaporation losses per year in million m³. **7**

Month	Area in km ²	Evaporation in cm
January	752	11
Feb	710	14
March	686	16
April	672	18
May	658	25
June	684	14
July	694	15
August	722	14
September	735	14
October	750	13
November	780	11
December	780	12

5. a) What is hydrograph ? What are the segments of hydrograph ? **6**
- b) The mean monthly temperature over a basin for a 12 month period from June to May are 25.8, 24.4, 23.8, 23.5, 23.5, 23.6, 20.2, 17.1, 16.6, 18.5, 23.3, 27.6 & 28.4°C resp. The observed rainfall in mm in the corresponding months are 86, 229, 208, 115, 15, 182, 10, 24, 24, 12, 0 & 0. Determine annual runoff for the basin using Khosla's formula. **7**

OR

6. a) Write short notes on. **6**
- 1) Classification of catchment
 - 2) Limitation of Unit hydrograph theory.
- b) The ordinates of a 4 hour unit hydrograph in m³/s for a basin at 4 hr intervals are 0, 4, 44, 70, 52, 38, 27, 18, 11, 6, 2, 0. **7**
- If a rainfall excess with intensity of 2.5 cm/hr for a period of 4-hr followed immediately by another 4-hr storm with an intensity of 1.5 cm/hr occurs on the basin, compute ordinates of resulting hydrograph.
7. a) Write short note on importance of statistics and probability in hydrology. **7**
- b) Give the importance of frequency analysis. **6**

OR

8. a) Write the procedure to estimate the design flood by using 'Gumbel's distribution'. **7**
- b) A flood of a certain magnitude has a return period of 25 year. **6**
- i) What is its probability of exceedance ?
 - ii) What is the probability that this flood may occurs in the next 12 years ?

9. a) Explain the following terms – 6
1) Unconfined aquifer
2) Confined aquifer
3) Storage coefficient

- b) A pumping test was made in a medium of sand and gravel to a depth of 12m where a bed of clay was encountered. The normal ground water level was at surface observation holes were located at distances of 4m and 10m from the pumping well. At a discharge of 3.6 lit/sec. From the pumping well, a steady state was attained in 24 hours. The drawdown at 4 m was 1.5m and at 10 m was 0.26m. Compute the coefficient of permeability of the soil. 8

OR

10. a) Distinguish between. 6
1) Hydraulic conductivity and Intrinsic permeability.

2) Specific yield and specific retention.

- b) A 200mm diameter well penetrator 40m below ground water level. After a long period of pumping at a rate $18\text{m}^3/\text{min}$. the drawdowns in the observation wells at 14m and 40m from the pumped well are 1.2m and 0.6m respectively. Determine the transmissibility of the aquifer. Take radius of influence as 320m. 8

11. a) What is watershed ? State and explain various objectives of watershed management. 5

b) Explain Interstate river dispute in details. 4

c) What do you mean by inter basin transfer ? 5

OR

12. a) Write a short note on "Recharge through Rain water harvesting". 5

b) Write a short note on water resources of India. 4

c) Write a note on multipurpose project. 5

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