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Reg.No: | | | | | | | | |

B.E (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2013

CIVIL ENGINEERING

Fifth Semester

CE 9306 – HYDROLOGY AND WATER RESOURCES ENGINEERING

(Regulation 2008)

Time : 3 Hours **Max. Marks 100**

Part - A **(10 x 2 = 20 Marks)**

Answer ALL Questions

1. Write the advantages of digital recording raingauges.
2. A lake has an area of 15 km^2. The annual rainfall of 700 mm, inflow to the lake 1.4 m^3/s, outflow from the lake 1.6 m^3/s are observed in a year. Assume no change in storage and no water exchange between lake and groundwater. Determine the evaporation during this year.
3. Why in hydrologic analysis, watershed approach is practiced rather than the administrative approach?
4. Write the significance of baseflow separation.
5. Define specific yield and safe yield of an aquifer.
6. Write the basic equation and its assumptions, which govern the movement of water in porous media.
7. Define Sediment yield.
8. What is trap efficiency?
9. How flood frequency analysis is useful in flood protection?
10. Define drought.

Part – B **(5 x 16 = 80 marks)**

11 (i) Explain the mass curve method to estimate the storage capacity of reservoir. (8)

(ii) State the various methods used to control the sedimentation in reservoirs. (8)

12(a) (i) In a double ring infiltrometer test, a constant depth of 100 mm was restored at every time interval when the level is dropped. The drop in levels are given below:

Time (min)	0	5	10	15	25	45	60	75	90	110	130
Depth of water (mm)	100	83	87	90	85	78	85	85	85	80	80

Establish the infiltration equation of the form developed by Horton. (10)

(ii) The normal annual rainfall at stations A, B, C and D in a basin are 80.97, 67.59, 76.28 and 92.01 cm respectively. In the year 1975, the station D was inoperative and the stations A, B and C recorded annual precipitations of 91.11, 72.23 and 79.89 cm respectively. Estimate the rainfall at station D in that year. (6)

(OR)

12(b) (i) The average rainfall over a basin of area 50 ha during a storm was as follows:

Time (h)	0	1	2	3	4	5	6	7
Rainfall (mm)	0	18	11	2	18	32	16	35

If the volume of runoff from this storm was measured as 2500 m^3, determine the phi index for the storm. (10)

(ii) Write the detailed procedure for calculating the PET using Penman Method. (6)

13(a) (i) Data on two meteorologically homogeneous catchments 1 and 2 are given below. A 9-h unit hydrograph was developed for catchment 1 and which has a peak value of discharge as 1000 m^3/s and time to peak from the beginning of excess rainfall as 18 h. It is required to develop a unit hydrograph for catchment 2, using Snyder's method. Catchment 1: L = 318 km; L_{ca} = 198 km; A = 4480 km^2, Catchment 2: L= 284 km; L_{ca} = 184 km; A = 3780 km^2. (12)

(ii) Enlist the different methods of stream flow measurement. (4)

(OR)

13(b) (i) The ordinates of a 6-h unit hydrograph are given. (12)

Time (h)	0	3	6	9	12	18	24	30	36	42	48	54	60	66
6-h UH ordinate (m^3/s)	0	150	250	450	600	800	700	600	450	320	200	100	50	0

A storm had three successive 6-h intervals of rainfall magnitude of 3, 5 and 4 cm respectively. Assuming a ϕ index of 0.20 cm/h and a base flow of 30m^3/s, determine and plot the resulting hydrograph of flow.

(ii) Explain briefly: Soil Conservation Service (SCS) Method. (4)

14(a) A non-leaky artesian aquifer is 30 m thick. A production well fully penetrating the aquifer is continuously pumped at a constant rate of 100 m^3/hr for a period of 1 day. The observed draw downs in a fully penetrating observation well at a distance of 80 m from the production well are given below. Compute the coefficient of transmissibility, permeability and storage coefficient of an aquifer.

Elapsed Time (min)	1	3	8	30	60	80	100	300	700	900	1000	1440
Drawdown(cm)	14	27	40	60	70	75	80	83	103	106	108	114

(OR)

14(b) (i) Drive an expression for the steady state discharge from a well in an unconfined aquifer. Draw a neat sketch and state clearly all the assumptions. (8)

(ii) Write the different techniques of geophysical exploration and explain any two. (8)

15(a) (i) Explain the factors involved in the design of artificial recharge structures and discuss its impact. (8)

(ii) Write short notes on (a) Inter basin transfer and (b) Drought Prone Area Programme (DPAP) (8)

(OR)

15(b) The record of annual flood at a place is given for 16 years. Estimate the recurrence interval for various magnitudes. By suitable extrapolation, determine the magnitude of annual flood at the site corresponding to a recurrence interval of (i) 15 years, (ii) 25 years (iii) 50 years and (iv) estimate the recurrence interval of a flood with a magnitude of 1500 m^3/s.

Year	1960	1961	1962	1963	1964	1965	1966	1967
Annual Flood (m^3/s)	690	810	940	860	680	830	900	1000
Year	1968	1969	1970	1971	1972	1973	1974	1975
Annual Flood (m^3/s)	740	670	650	920	1070	1020	870	840
