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B.E (FULL TIME) DEGREE END SEMESTER EXAMINATION, APRIL/MAY - 2013
AGRICULTURAL AND IRRIGATION ENGINEERING
IV SEMESTER
AI 9252 – HYDROLOGY AND WATER RESOURCES ENGINEERING

2013/13

Time: 3 hr

REGULATION 2008

Marks: 100

Part – A

10 x 2 = 20

Answer ALL questions

1. Define hydrology.
2. What is the evaporation, if 4.75 liters of water is removed from an evaporation pan of diameter 1.22 m and simultaneous rainfall measurement is 9.9 mm?
3. Define time of concentration.
4. Differentiate between hyetograph and hydrograph.
5. What is firm yield and secondary yield of a reservoir?
6. Distinguish between purposive and non-purposive canal.
7. The water levels in two observation wells 350 m apart are + 210.5 and + 206.25 m respectively. If the hydraulic conductivity and porosity of the aquifer are 12.5 m/day and 15 %, what is the actual velocity of flow in the aquifer?
8. While design of Rainwater Harvesting structures in open areas, what are the parameters that need to be considered?
9. How flood and drought are defined with respect to time and depth of flow/precipitation?
10. Write an equation used to estimate the meteorological drought index.

Part - B

5 x 16 = 80

11. The evaporation from a lake is to be calculated by the water balance method. Inflow to the lake occurs through three small rivers A, B, and C. The outflow occurs through river D. Calculate the evaporation from the lake surface during summer (May – August) if the water level was at + 571.04 m on May 1 and + 571.10 m on August 31. The lake surface area is 100 km². The precipitation P during the period was 100 mm. Average inflows and outflow are given below.

(8)

River	A	B	C	D
Catchment (km ²)	150	120	130	---
Q average (m ³ /s)	15.0	20.0	17.0	45.0

(ii) Determine Φ index and W – index for a watershed with an area of 100 km². A rainfall with the specifications given in the following table occurred in the watershed.

Time (min)	0 – 30	60 – 120	120 – 150
Intensity (cm/hr)	0.300	1.205	1.500

The average flow measured at the outlet of the watershed was 100 m³/s. Assume the retention to be 10% of rainfall. (8)

12. (a) (i) Discuss briefly Strange's table and SCS method of runoff estimation. (8)
(ii) Explain the various direct methods of stream flow measurement with neat sketches. (8)

(OR)

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

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

A storm had three successive 6-h intervals of rainfall magnitude of 3.0, 5.0 and 4.0 cm respectively. Assuming a Φ index of 0.20 cm/h and a base flow of 30 m³/s, determine and plot the resulting hydrograph. (16)

13. (a) (i) Discuss the procedure for fixing the storage capacity of a reservoir by ripple mass curve method. (8)
(ii) What are the measures to be adopted for controlling sediment inflow into a reservoir? (8)

(OR)

13. (b) Write short note on the following
- (i) Cross drainage works (8)
- (ii) Canal alignment (8)

14. (a) (i) Explain the various sub-surface geological formation with sketch. (8)
- (ii) An unconfined aquifer with a specific yield of 0.20 is used as a water supply for the irrigation of farm land. The recharge area of the aquifer is same as the irrigated area. The recharge is limited to 76 mm per year. The saturated thickness of the aquifer is 15.2 m. How many years will the water supply last if 254 mm of water per year is pumped from the aquifer for irrigation? (8)

(OR)

- (b) Elaborate the importance of rainwater harvesting in rural and urban areas and explain its types with suitable sketch. (16)

15. (a) Annual flood discharge in a river for a period of 15 years is given below. Estimate the flood frequency 25 and 50 year's of return period using Weibull's method.

Year	1966	1967	1968	1969	1970	1971	1972	1973
River flow (m ³ /s)	519	456	545	534	453	474	466	478
Year	1974	1975	1976	1977	1978	1979	1980	
River flow (m ³ /s)	554	433	437	458	545	560	435	

(OR)

- (b) (i) Drought – an integrated approach is needed – why? Write a note on the various drought mitigation / management measures. (8)
- (ii) Write short note on NDVI analysis. (8)