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06CV55

Fifth Semester B.E. Degree Examination, May/June 2010
Hydrology and Water Resources Engineering

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Briefly explain qualitative representation of a hydrologic cycle. **(06 Marks)**

b. Describe the various types of precipitation, with sketches. **(06 Marks)**

c. Following are the rain gauge observations during a storm:

Time since start of storm, mins.	5	10	15	20	25	30	35	40	45	50
Accumulated rainfall , cms	0.1	0.2	0.8	1.5	1.8	2.0	2.5	2.7	2.9	3.1

Construct i) Mass curve of precipitation ii) Hyetograph. **(08 Marks)**

2 a. Describe with a neat sketch, the working of a float type recording rain gauge. What are the advantages and disadvantages of it? **(06 Marks)**

b. What are the recommendations of Indian standard institution on rain gauge network establishment? **(06 Marks)**

c. A catchment has 8 rain gauges of which one is a self recording type and 7 are the standard type. For a 5% error in the estimation (E) of the mean rainfall, what should the required no. of additional rain gauges, if annual precipitation at the 8 stations are?

Station	A	B	C	D	E	F	G	H
Rainfall (cm)	74	87	94	88	104	118	60	95

(08 Marks)

3 a. Explain mass curve analysis, with a neat sketch. Define intensity, duration and frequency of rainfall. **(06 Marks)**

b. Describe a double ring infiltrometer for measuring infiltration rate. What is the significance of the outer ring? **(06 Marks)**

c. Total observed runoff volume during a 6 hr storm with a uniform intensity of 15mm/hr is 21.6×10^6 cum. If the area of the basin is 300 sq.km, find the average infiltration rate for the basin. **(08 Marks)**

4 a. Describe ISI standard evaporation pan, with a neat sketch. **(06 Marks)**

b. What factors affect the infiltration rate? **(06 Marks)**

c. Determine the E.T. and irrigation requirement for wheat, if the water application efficiency is 65% and the (Cu) coefficient for the growing season is 0.8 from the following data:

Month	Mean monthly temp. °C	Monthly % of sunshine hrs.	Effective rainfall, cm
Nov	18.0	7.20	2.6
Dec	15.0	7.15	2.8
Jan	13.5	7.30	3.5
Feb	14.5	7.10	2.0

(08 Marks)

PART – B

5 a. Define ϕ-index and ω-index. Bring about the difference between them. **(06 Marks)**

b. What are the various methods of measuring discharge of a stream? Explain any one of them. **(06 Marks)**

c. A small watershed consists of 1.5 sq.km of cultivated area (C = 0.20) 2.5 sq.km under forest (C = 0.10) and 1 sq.km under grass cover (C = 0.35) and there is a fall of 22m in a water course of 1.8 km. The intensity frequency duration selection for the area may be taken as

$I = \frac{80T_r^{0.2}}{(t_c + 13)^{0.46}}$ where I(cm/hr), T_r(years), T_c=mins.

Estimate the peak rate of runoff for a 25 year frequency. **(08 Marks)**

6 a. List the various factors affecting runoff. Discuss the effect of antecedent precipitation on runoff. **(06 Marks)**

b. What are the components of unit hydrograph? Write a note on its applications. **(06 Marks)**

c. Derive 6 hr unit hydrograph for the catchment 300 sq.km for the given 3 hr unit hydrograph for the same catchment and plot the same. **(08 Marks)**

Time in hr	0	3	6	9	12	15	18	21	24
Ord. of UH (m^3/sec)	0	1.5	4.5	8.6	12.0	9.4	4.6	2.3	0.8

7 a. Derive the expression for the discharge from a unconfined aquifer under steady flow conditions. Mention the assumptions made during the same. **(06 Marks)**

b. Define the terms: Aquifer, aquifuge, unconfined aquifer, confined aquifer, perched aquifer and aquiclude **(06 Marks)**

c. Write a note on reservoir sediment control, in detail. **(08 Marks)**

8 a. Explain the factors affecting erosion that takes place in the upstream of the irrigation tank. **(06 Marks)**

b. Write importance of a water resources project, with respect to irrigation sector in our country. **(06 Marks)**

c. Write short notes on importance of rain water harvesting in the present scenario. **(08 Marks)**

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