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CE–502

B. E. (Fifth Semester) EXAMINATION, June, 2009

(Civil Engg. Branch)

WATER RESOURCES ENGINEERING

(CE—502)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Assume suitable data, if necessary.

1. (a) Name the various non-recording and recording rain gauges. Describe *one* from each type in detail. 10

   (b) The catchment area of a basin is in the shape of a regular hexagon of side 40 km. Seven rain gauges located one at each end of the hexagon and one at centre recorded precipitation 5, 10, 20, 30, 50, 60 and 70 cm respectively. Compute the average precipitation over the basin and justify the method used. 10

Or

2. (a) Define the following : 10

   (i) Infiltration indices

   (ii) Evaporation

   (iii) Transpiration

   (iv) Interception losses

(b) Determine ϕ-index for a basin 500 km^2. The direct runoff of flood was 3 cm and rainfall depth over basin is given as under 10

Time (hr.)	Rainfall (cm)
0—1	2·0
1—2	3·0
2—3	6·0
3—4	4·0
4—5	1·0

3. (a) Describe the factors affecting runoff and its estimation. 10

(b) Following ordinates of flood hydrograph were recorded in a stream resulting from a storm in catchment having an area 10000 hectares. Base flow is 10 cumecs : 10

Time (hr.)	Discharge (m^3/sec.)
0	10
6	18
12	20
18	45
24	30
30	20
36	15
42	12
48	10

(i) Find the runoff in cms.

(ii) Find the ordinates of unit hydrograph.

Or

4. (a) Describe the following : 10

(i) Unit hydrograph

(ii) Synthetic unit hydrograph

(b) The ordinates of 4 hr. unit hydrograph are as under. Determine ordinates of 12 hr. unit hydrograph : 10

Time (hr.)	O. U. H. (m^3/sec.)
0	0
4	10
8	30
12	80
16	100
20	50
24	20
28	05
32	0

5. (a) Name the various flood control methods and describe any *one* of them in detail. 10

(b) Estimate the flood magnitude with a return period of 500 years using Gumbel's method with the following data : 10

Return period T (years)	Peak flood (m^3/s)
50	35000
100	45000

Or

6. (a) Name the various methods of estimating peak flood and describe the method used for small size catchments. 10

(b) Route the ahead flood hydrograph through the river reach for which $k = 12 \cdot 0$ hrs. and $x = 0 \cdot 20$. At the start of inflow flood the outflow discharge is 20 m^3/s.

Time (hrs.)	Inflow (m^3/sec.)
0	20
6	25
12	50
18	60
24	55
30	45
36	35
42	28
48	25
54	20

7. (a) Describe the following : 10

   (i) Waterlogging causes

   (ii) Salt efflorescence causes

   (b) Describe in detail reclamation methods for a water logged area. 10

Or

8. (a) Define the following : 10

   (i) Infiltration gallery

   (ii) Groundwater recharge

   (b) Two tube wells each of 20 cm diameter are spaced 150 m distance, both the well penetrate fully a confined acquifer of 12 m thickness. Calculate discharge. If one well is discharging under a depression head of 3·0 m, what will be the percentage decrease in discharge of the well if both the wells are discharging under the depression head of 3·0 m ? Take radius of influence for each well equal to 250 metres and coefficient of permeability of acquifer as 50 metres/day. 10

(a) Name the various water resource based projects and describe in detail the data required for the planning of any *one* of them in detail. 10

(b) Describe various techniques for rain water harvesting. 10

Or

(a) Describe the basic principles for cost allocation. 10

(b) Apportion the cost of Rs. 6,000 crores multipurpose project of the following. 10

Estimated use storage capacity :

(i) For flood control = 5000 M cu. m

(ii) For power = 2500 M cu. m

(iii) For irrigation = 3000 M. cu. m

Separable cost :

(i) Flood control = 2500 crores

(ii) Irrigation = 1500 crores

(iii) Power = 1000 crores