

Code: CE5T3

**III B.Tech - I Semester – Regular/Supplementary Examinations  
October 2017**

**WATER RESOURCES ENGINEERING - I  
(CIVIL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

**PART – A**

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

- a) What is evapotranspiration? And explain any two methods of estimation.
- b) Write a short note on “Double mass curve”.
- c) Define “Unit Hydrograph”. What would the advantages of having a 1hr UH be?
- d) State and explain the two major assumptions in deriving Unit Hydrograph analysis.
- e) Differentiate between “watershed divide and Ground water divide”.
- f) What are Dupit’s assumptions?
- g) Explain border strip flooding method and for which type of crops it is applicable.
- h) Define “Duty”, “Delta”, “Base period” and “crop period”.
- i) What is “crop rotation”? Explain with an example.
- j) What do you mean by “economical section” of a canal?
- k) What are the drawbacks of Kennedy’s theory?

## PART – B

Answer any **THREE** questions. All questions carry equal marks.

3 x 16 = 48 M

2.a) With a neat sketch, explain how evaporation can be measured using IS class A pan? 8 M

b) There are four rain gauge stations existing in the catchment of a river.

Station Name	A	B	C	D
Average annual rainfall (mm)	800	620	400	540

Determine the optimum number of rain gauges in the catchment, if it is desired to limit the error in the mean value of rainfall in the catchment to 10%. 8 M

3.a) The following data indicates flood data-statistics of river Godavari in Maharashtra:

S.No.	River	Length of Record	Mean annual flood( $m^3/s$ )	$\sigma_{n-1}$
1.	Godavari river	92	6437	2951

Estimate 100 and 1000 years floods for the river by using Gumbel's method. (Given: Reduced mean for 92 yrs is 0.5589; reduced standard deviation is 1.2020 in extreme Gumbel's distribution). 8 M

- b) What is “Synthetic Unit Hydrograph” and explain its procedure in detail. 8 M
- 4.a) The elevation of water table in an unconfined aquifer at two locations separated by a distance of 100 metres is 1026.2m and 1025m respectively. If the hydraulic conductivity of the aquifer is 12 m/day and porosity 15%. Find the actual velocity of flow in the aquifer. 8 M
- b) Define terms (i) Permeability (ii) Transmissibility (iii) Aquifer (iv) Specific yield. 8 M
- 5.a) An irrigation canal has GCA of 80,000 hectares out of which 85% is culturable irrigable. The intensity of irrigation for Kharif season is 30% and for Rabi season is 60%. Find the discharge required at the head of the canal if the duty at its head is 800 hectares/cumecs for Kharif season and 1700 hectares /cumec for Rabi season. 8 M
- b) Derive the relationship between Duty, Delta and Base period. 8 M
- 6.a) Explain the steps involved in the unlined canal design on alluvial soil by Kennedy’s theory. 8 M

b) Find the maximum discharge through an irrigation channel having the bed width 4 m and full supply depth is 1.50 m. Given that Coefficient of rugosity,  $N = 0.02$ , bed slope = 0.0002 and side slope = 1:1. Assume reasonable data if necessary. Comment whether the channel will be in scouring or silting. 8 M