(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2694 Roll No. [   ]

B.Tech.

(SEM. VII) ODD SEMESTER THEORY
EXAMINATION 2013-14

WATER RESOURCES ENGINEERING

Time : 3 Hours   *Total Marks : 100*

Note :– Attempt **all** questions. All questions carry equal marks. If required any missing data; then choose suitably.

1. Attempt any **four** parts of the following :   **(5×4=20)**

   (a) Describe the concept of hydrologic cycle with the help of a neat sketch. What are the different components of the hydrologic cycle ? What do you mean by hydrologic system ?

   (b) A basin has the shape in the form of a regular pentagon with each side of the length of 2 km. The five rain – gauges located at the corners recorded the rainfall as 60, 81, 73, 59 and 45 mm respectively. Compute the average depth of rainfall over the basin by arithmetic mean method and Theissen Polygon method. Sketch few isohytes also.

   (c) Write short notes on :

       (i) Intensity – Duration Curve and

       (ii) Probabilistic Maximum Precipitation Curve.

   (d) What do you understand by consumptive use of water ? What are the factors affecting consumptive use of water ? List the various direct methods of measurement of consumptive use of water.

(e) Define infiltration and describe the factors that affect the process of infiltration. How will you measure the rate of infiltration?

(f) What do you understand by infiltration indices? How do you determine them?

2. Attempt any **four** parts of the following : (5×4=20)

(a) What is run-off? What are the factors that affect the run-off from a catchment area? Describe the methods of computing run-off from a catchment area.

(b) The ordinates of 3 – hours unit hydrograph of a catchment area are given below :

Time (hour)	0	3	6	9	12	15	18	21
Ordinate (m³/s)	0	10	20	16	12	8	4	0

Derive the flood hydrograph at the catchment outlet due to storm as given below :

Time of start of storm (hour)	0	3	6	9
Accumulated rain fall (mm)	0	39	47	76

Assume φ index of the catchment as 3mm/hour and constant base flow of 10.0 m³/s.

(c) Write a short note on 'Synthetic Unit Hydrograph'. How will you derive the synthetic unit hydrograph from a number of unit hydrograph? Illustrate the method with suitable example in a tabular form.

(d) Distinguish between flow irrigation and lift irrigation. The base period, duties at the field and area to be irrigated for

various crops under a reservoir are given below :

Crop	Base Period (days)	Duty at field (hectares/cumec)	Area (hectares)
Wheat	120	1800	2400
Rice	110	1000	3010
Sugarcane	360	900	4890
Vegetables	130	750	1650

Find the capacity of the reservoir in hectares meter if the conveyance loss and reservoir loss are 26% and 10% respectively.

(e) What is meant by 'crop rotation' ? What are the advantages of crop rotation ? Describe in brief with suitable examples.

(f) Distinguish between perennial and inundation canal. Describe the various factors considered for alignment of a canal. What is Bandhara irrigation system ?

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) What do you understand by regime channel ? Explain the initial regime and final regime of a channel. Using Lacey's theory, design an irrigation channel for the following data :

Discharge, Q = 50 cumecs
Lacey's silt factor, f = 1.0
Trapezoidal section side-slope = 0.5 : 1

(b) Explain 'water logging'. What are the various causes of water logging ? Describe the adverse effects of water logging. What are the various methods adopted as anti-water logging measures ?

(c) Design a concrete lined channel to triangular section to carry a discharge of 45 cumecs at a slope of 1 in 10 km. The side slopes of the channel are 1.25 : 1 and Manning's coefficient 'N' may be taken as 0.018.

4. Attempt any **two** parts of the following : (10×2=20)

(a) Describe 'canal regulation works'. What are the different types of canal regulation works provided ? What are the functions of a canal fall ?

(b) What is an outlet ? What are the functions of an outlet ? Distinguish between non-modular, semi-modular and modular types of outlets with suitable examples.

(c) What is the concept of 'river training' ? What do you mean by river training for discharge, river training for depth and river training for sediment ? List the various types of river training works and explain any one of them with suitable sketches.

5. Attempt any **two** parts of the following : (10×2=20)

(a) Describe an expression for the yield of tube-wells for the case of an un-confined aquifer. A 30 cm well fully penetrates an un-confined aquifer of 25 m depth. When a discharge of 2100 liters/minute was being pumped for a long time, observation wells at radial distances of 30 m and 90 m indicated draw down of 5 m and 4 m respectively. Estimate the coefficient of permeability and transmissibility of the aquifer.

(b) Briefly describe the relative merits and demerits of well irrigation and canal irrigation. What are the factors that govern the selection of suitable site for a tube well ?

(c) Write short notes on :

(i) Well shrouding and well development

(ii) Types of open wells

(iii) Infiltration galleries.