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

Roll No.

B.Tech.

(SEM. VII) ODD SEMESTER THEORY EXAMINATION 2012-13

WATER RESOURCES ENGINEERING

Time : 3 Hours   *Total Marks : 100*

Note : *(i) Attempt all questions.*

(ii) Each question carries equal marks.

(iii) Use any missing data suitably.

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

   (a)   Explain with the help of a diagram the concept of hydrologic cycle. What are the different components of hydrologic system ? Describe in brief with suitable examples.

   (b)   What do you understand by precipitation ? Explain various types of precipitation.

   (c)   Describe various methods of computing average rainfall over a basin. How will you ascertain the missing rain-gauge data ?

   (d)   Describe the salient features of probabilistic maximum precipitation curves.

   (e)   What do you understand by consumptive use of water ? What are the factors affecting consumptive use of water ?

   (f)   Explain the process of infiltration. How the run-off is estimated by infiltration method ? Explain the infiltration indices.

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

(a) What is the concept of Unit Hydrograph ? Explain the various assumptions involved in the theory of unit hydrograph.

In the following table the rainfall data at every 2-hours interval are given. Construct the ordinate of unit Hydrograph. Assume the area of the basin = 25 km².

Hour	00	02	04	06	08	10	12	14
Total Discharge (Cumec)	6	8	10	16	28	42	60	80
Hour	16	18	20	22	24	26	28	30
Total Discharge (Cumec)	110	100	90	80	68	56	45	35
Hour	32	34	36	38	40	42	44	
Total Discharge (Cumec)	26	18	11	9	8	7	6	

(b) The Hourly distribution of a 2-hour Unit Hydrograph are given below. Derive a 6-hours Unit hydrograph ordinates.

Time (Hours)	0	1	2	3	4	5	6	7	8
Discharge (Cumec)	0	1.0	2.7	5.0	8.0	9.8	9.0	7.5	6.3
Time (Hours)	9	10	11	12	13	14	15		
Discharge (Cumec)	5.0	4.0	2.9	2.1	1.3	0.5	0		

(c) What do you understand by crop-rotation ? What are its advantages ?

A field channel has CCA of 2000 ha. The intensity of irrigation for gram is 30% and for wheat is 50%. Gram has kor-period of 18 days and kor-depth of 12 cm, while wheat has a kor period of 15 days and a kor-depth of 15 cm. Calculate the discharge of the field channel.

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

(a) Design an irrigation channel in alluvial soil according to Lacey's silt theory, with the given following data :

Full supply discharge : 1.5 cumecs

Lacey's silt factor : 1.0

Channel side slope : $\dfrac{1}{2}$: 1

(b) Describe the main features of the cross-section of an irrigation channel with suitable sketches.

(c) What is the problem of water logging ? What are the poor effects of water logging ? Describe some suitable remedial measures against water logging in brief.

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

(a) What are the different types of canal regulation works constructed for efficient working and safety of an irrigation channel ? Describe in brief with suitable sketches.

(b) What is an outlet ? Write down the requirements that an outlet should fulfil. Distinguish clearly between non-modular and semi-modular outlets with suitable examples.

(c) What do you mean by river training ? Give the classification of various types of river-training work. What do you mean by high water training, low water training and medium water training ?

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

(a) Describe various zones of under-ground water. Explain the terms : aquifer, aquiclude, and aquifuge.

(b) An artesian tube-well has a diameter of 20 cm. The thickness of aquifer is 30 cm and its permeability is 38 m/day. Find its yield under a draw-down of 4 m at the well face. Use radius of influence as recommended by Sichardt.

(c) Explain the method of determining the coefficient of transmissibility of a confined aquifer by pumping out test. How can this method be extended for unconfined aquifer ?

(d) Distinguish clearly between a shallow well and a deep well. How does a deep well differ from a tube-well in confined aquifer ?

(e) Two tube-wells, each of 20 cm diameter are spaced at 100 m distance. Both the wells penetrate fully a confined aquifer of 12 m thickness. Calculate the discharge if only one-well is discharging under a depression head of 3 m. What will be the percentage of decrease in the discharge of the well if both the wells are discharging under the depression head of 3 m. Take radius of influence for each well equal to 250 m and coefficient of permeability of aquifer as 50 m/day.

(f) Describe in brief the advantages and disadvantages of well irrigation over canal irrigation.