

Fifth Semester B Tech Degree Examination, Nov 2015

(2013 Scheme)

13.506: WATER RESOURCE ENGINEERING (C)

Time: 3 Hours

Max marks: 100

PART- A

Answer **all** questions. **Each** question carries **4** marks.

1. What are the assumptions and limitations of Unit Hydrograph Theory?
2. Explain briefly how seepage endangers the safety of a hydraulic structure on permeable foundation.
3. Explain 'frequency and intensity of irrigation'.
4. Discuss the principle of recuperation test of an open well.
5. Explain the purpose of providing guide banks.

PART –B

Answer **one full** question from each module. **Each** question carries **20** marks.

Module – 1

6. The following are the ordinates for a flood hydrograph resulting from an isolated storm of 6 hours duration.

Time (h)	0	12	24	36	48	60	72	84	96
Ordinates of flood hydrograph (cumec)	5	15	40	80	60	50	25	15	5

Determine the ordinates of 6 hr unit hydrograph if the catchment area is 450km^2 . **[15]**

b) Distinguish between field capacity and permanent wilting point. **[5]**

7. a) The following is the set of observed data for successive 15 minutes period of 100 minutes storm in a catchment :

Duration (min)	15	30	45	60	75	90	105
Rainfall (cm/h)	2.0	2.0	8.0	7.0	1.25	1.25	4.5

If the value of ϕ - index is 3 cm/h, estimate the net runoff, the total rainfall and the value of W-index. **[10]**

b) Describe the S curve method of developing a 6- h UH by using 12-h UH. **[10]**

Module – 2

8. a) Design a regime channel for a discharge of $35\text{m}^3/\text{s}$ with silt factor of 0.9 by Lacey's theory, taking side slope as 1H: 2V. **[15]**

b) Define culturable command area and intensity of irrigation. **[5]**

9. a) The irrigated area of a water course is 800 ha. The intensity of rice in this area is 65%. The duration for transplantation of rice is 15 days and the total depth of water required by the crop is 60 cm, on the field, during transplantation period. The useful rain falling during transplantation period is 15 cm. Find the duty of the irrigation water for the crop on the field during transplantation at the head of the field channel and at the head of the distributary, if the losses of water in the water course is 25%. Also find the discharge in the water course. **[10]**

b) What are the different ways in which irrigation canal can be aligned? **[10]**

Module – 3

10. a) Distinguish with sketches if necessary, the difference between an unconfined and a confined aquifer. **[6]**

b) Derive a formula for discharge of a well in homogenous unconfined aquifer. **[10]**

c) State the assumptions on which the above derivation is based. **[4]**

11. a) Two tube wells each of 20 cm diameter are spaced at 100 m distance. Both the wells penetrate fully in 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 decrease in discharge if both wells are discharging under a depression head of 3 m? Take the radius of influence of each well as 250 m and coefficient of permeability of the aquifer as 60m/day?

[10]

b) Explain the method of determining the coefficient of transmissibility of a confined aquifer by pumping out test. How can this method be applied for unconfined aquifer? **[10]**

Module – 4

12. a) Briefly explain what is meant by useful life of a reservoir and how it is estimated. **[10]**

b) Using the equation $V \text{ (m/s)} = 0.65N + 0.03$, obtain the velocity at 0.6 times the depth from the free surface. Here N stands for revolutions/s. Data on current meter observations are given in tabular form.

Distance from one bank (m)	Depth(m):y	Current meter observations at 0.6y	
		No : of revolutions	Time in seconds
3.0	0.4	30	150
6.0	0.8	50	130
9.0	1.2	70	100
12.0	2.0	100	80
15.0	3.0	150	60
18.0	2.5	200	50
21.0	2.2	130	40
24.0	1.0	90	130

Also compute the discharge through the section by method of mid section. **[10]**

13.a) List the objectives of river training works. **[5]**

b) With the help of sketches, describe briefly the various methods of river training works. **[15]**