

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

PAPER ID : 2694

Roll No.

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B.Tech.

(SEM. VII) THEORY EXAMINATION 2011-12

WATER RESOURCES ENGINEERING

Time : 3 Hours

Total Marks : 100

Note :— Attempt **all** the questions. **All** questions carry equal marks.

Assume any missing data suitably.

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

(a) Explain the salient features of hydrologic cycle with suitable sketch.

(b) A precipitation station X; was inoperative for some time during which a storm occurred. The storm totals at three stations A, B and C surrounding X, were respectively 6.60, 4.80 and 3.70 cm. The normal annual precipitation amounts at stations X, A, B and C are respectively 65.6, 72.6, 51.8 and 38.2. Estimate the storm precipitation for station X.

(c) What do you understand by consumptive use of water ? State and describe B Laney–Criddle method for the estimation of consumptive use of water for a particular crop.

(d) What is probable maximum precipitation over a basin ?

Explain any one of the approaches to estimate the PMP value.

(e) Write about the I.S.I. Evaporated Pan with the help of neat sketch.

(f) The infiltration capacity in a basin is represented by Horton's equation as $f_p = 4.0 + e^{-3t}$; where f_p is in cm/h and t is in hours. Assuming the infiltration to take place at capacity rates in a storm of 60 minutes duration, estimate the depth of infiltration in the first 15 minutes and in the second 45 minutes of the storm.

2. Attempt any four parts : (5×4=20)

(a) What are the factors affecting run-off from a catchment area ?

(b) Describe the estimation of run-off by infiltration method.

(c) What is a hydrograph ? Draw a single peaked hydrograph and explain its various components.

(d) What do you understand by unit-hydrograph ? How it is described ? Explain its use in construction of flood hydrograph resulting from two or more periods of rainfall.

(e) Find out the ordinates of a storm hydrograph resulting from a 3 hours storm with rainfall of 3, 4.5 and 1.5 cm during

subsequent 3 hours intervals. The ordinates of unit hydrograph are given in table given below :

Hours	0	03	06	09	12	15	18	21	24	03	06	09	12
Ordinates of Unit Hydrograph (Cumecs)	0	90	200	350	450	350	260	190	130	80	45	20	0

(f) Write a short note on Canal Alignment.

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

(a) Using Kennedy's method of channel design, find the dimensions of an irrigation canal to carry a discharge of 1.4 cumecs. Assume $N = 0.0225$, $m = 1$ and $(B/D) = 5.7$.

(b) A channel section has to be designed for the following data :

Discharge (Q) = 30 cumecs

Silt factor (f) = 1.00

Side slope = 1/2

Find also the horizontal slope.

(c) What do you mean by water logging ? How water-logging becomes a problem ? Describe various methods adopted to prevent water logging.

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

(a) Differentiate between non-modular and semi-modular outlets. Explain the Kennedy's gauge outlet with its relevant uses.

- (b) What do you understand by head regulator ? State functions of a distributary head regulator and a cross-regulator.
- (c) Classify the river or alluvial plains and on the basis of their classification explain 'meandering'. Give the causes of meandering and write the basic factors controlling the process of meandering.

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

- (a) Define the following terms in brief : *Aquifer, Well loss, Specific capacity, Specific yield, Efficiency of a well and Interference among wells*. Give the expression when it shows the interference between two wells.
- (b) What are differences between open wells and tube wells by which you can categorise the tube wells ? Also write any one of the method of developing a tube well.
- (c) An aquifer of 20 m average thickness is overlain by an impermeable layer of 30 m thickness. A test well of 0.5 m diameter and two observation wells at a distance of 10 m and 60 m from the test well are drilled through the aquifer. After pumping at the rate of $0.1\text{ m}^3/\text{sec}$ for a long time, the following draw downs are stabilised in these wells : First observation well, 4 m ; Second observation well, 3 m . Determine the coefficient of permeability.