

S.No. : 200

BCE 2801

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

PAPER ID : 23171

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B. Tech. Examination 2021-22

(Even Semester)

WATER RESOURCE ENGINEERING

Time : Three Hours]

[Maximum Marks : 60

Note :- Attempt each question.

SECTION - A

1. Attempt all parts of the following : $8 \times 1 = 8$

- (a) Define the term 'Hydrology'.
- (b) Explain humidity and relative humidity.
- (c) A catchment consists of 40% area with run off coefficient 0.3 with the remaining 60% area with run off coefficient 0.50 the equivalent run off coefficient will be.

[P. T. O.

- (d) For the catchment area of 120 km^2 , the equilibrium discharge in m^3/hours of an s-curve obtained by the summation of 6 hour unit hydrograph is
- (e) What do you mean by regime channel?
- (f) The average size of the bed material may be taken as 0.8 mm what is silt factor?
- (g) What do you mean by canal escape?
- (h) Discuss 'mean type river training work'.

SECTION – B

2. Attempt any two parts of the following: $2 \times 6 = 12$

- (a) What do you mean by hydrological cycle? Explain its various component with neat sketch.
- (b) How to calculate run off by using infiltration capacity curve (I.C. curve)?
- (c) How to design the canal using Garret's diagram. Write down different design step using diagram.

(d) Write short notes on the following :

(i) Crump's open flume outlet

(ii) Punjab open flume outlet

SECTION – C

Note :- Attempt all questions. Attempt any two parts from each questions. $5 \times 8 = 40$

3. (a) There are four rain guage stations existing in the catchment of a river, the average annual rainfall values at these stations are 800, 620, 400 and 540 mm respectively. Determine the optimum number of rain gauge in the catchment if $E = 10\%$.

(b) The following are the rates of rainfall for successive 20 minutes period of a 140 minutes storm : 2.5, 10.0, 7.5, 1.25, 1.25, 5.0 cm/hr take $\phi_{\text{index}} = 3.2$ cm/hr. Find out net runoff in cm, the total rainfall and w_{index} .

(c) Prove that 'the spherical flow is much less efficient then the radial flow'.

[P. T. O.]

4. (a) Two identical-tube wells penetrating fully a 12m thick aquifer are located at 180 m apart the tubewell have diameter of 30 cm, $R = 300\text{m}$, and $K = 10^{-3} \text{ m/sec}$. Compute :
- Discharge of tube well when only one is working with a drawdown of 5m.
 - Percentage decrease in discharge of the tubewell, if both are working with a drawdown of 5m.
- (b) The IUH of a catchment is triangular in shape with a base of 36 h peak of $20 \text{ m}^3/\text{s}$ occurring at 8 hours from the start derive 2-h unit hydrograph for this catchment.
- (c) Determine the capacity of the reservoir, if its C.C.A. = 50,000 hest from the following data :

Crop	B in days	D in hect/cymec.	Intensity of Irray as %
Wheat	120	1900	25
Rice	120	1000	10
Sugarcane	330	2500	15

Assume the canal and reservoir losses as 5 and 8 percentage respectively.

5. (a) Using Lacey's theory, design an irrigation channel for the following data :

$$Q = 50 \text{ cumecs, } f = 1, \text{ side slope } 1\frac{1}{2}$$

- (b) Design a trapezoidal shaped concrete lined channel to carry a discharge of 100 cumecs at a slope of 25 cm/km. The side slope of the channel are $1\frac{1}{2}$, $N = 0.016$. Assume limiting velocity as 1.5 m/sec.
- (c) Given $L = 50 \text{ m}$, $a = 10 \text{ m}$, $b = 10.3 \text{ m}$, $k = 1 \times 10^{-5} \text{ m/sec}$. if the drains carry 1% of average annual rainfall in 24 hours, find the average annual rainfall.

6. (a) Write short notes on the following :

- (i) Canal fall
- (ii) Head regulator and cross regulator
- (iii) Canal escape
- (iv) Canal outlet

- (b) Design a submerged pipe outlet for the following data :

$$\text{Discharge through outlet} = 0.04 \text{ cumeu}$$

F.S.L. of distributing canal = 100 m

F.S.L. of water course = 99.90 m

Full supply depth of distributing canal = 1.1 m

Assume an average value of coefficient of discharge as 0.7.

(c) Write short notes on the following :

- (i) Aggrading and degrading type river
- (ii) Objective of river training work
- (iii) Groynes or spurs with one figure
- (iv) Marginal embankment with one neat fig.
- (v) Bank protection with one neat sketch

