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DAI1351

Water Resources Engineering - I (New) (1220)

P. Pages : 4

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Answer two questions from each unit.
5. Assume suitable data wherever necessary and mention it clearly.
6. Neat sketch / diagram should be drawn wherever necessary.
7. Black figure to the right indicates full marks.
8. Use of non programmable pocket calculator is allowed.

UNIT - I

1. How the rainfall is measured ? Mention the different types of recording and non recording type of raingauges. Discuss any one of them in detail. What are the various precautions which are taken during their installations. 10
2. i) Discuss the factors affecting evaporation and also discuss the difference between evaporation, transpiration, evapotranspiration and consumptive use. 5
ii) For a storm of 2 - hour durations the rainfall rates are as follows : 5

| | | | | | | |
|-------------------------|-----|-----|----|-----|-----|------|
| Time Period (minutes) | 20 | 20 | 20 | 20 | 20 | 20 |
| Rainfall Rate (cm/Hour) | 2.5 | 2.5 | 10 | 7.5 | 5.1 | 1.25 |

If ϕ index is 3cm/hour. Estimate the surface run off.

3. i) Distinguish between (2.5x2=5)
 - a) Mass rain fall curve and hyetograph.
 - b) Intensity - Frequency - Duration relationship.

- ii) The raingauge station X was in operative for a part of month during which a storm occurred. The storm rainfall recorded at the three surrounding stations A, B and C was 75mm, 59mm and 86mm respectively. If the aar at the stations A, B, C and X are 750, 650, 850 and 700 mm respectively, estimate the storm rainfall of station X. 5

UNIT - II

4. i) Describe any one method that you would suggest for determination of discharge in a river when it is in flood. 5
- ii) What are the various methods of seperation of base flow. Discuss any one of them in detail. 5
5. i) Discuss in brief the slope area method for computing discharge of a river. 5
- ii) Describe with the help of neat sketch the "synthetic unit hydrograph." 5
6. A 3 - hour unit hydrograph for a basin can be approximated by a triangle of base 24 hour and peak of 50 cumec occurring after 8 hour from the begining. A 3 hour storm occurred over the basin with an intensity of 2.6cm /Hour. Assuming an average loss rate of 6mm/hour and constant base flow of 6 cumec, determine the stream flow at 4, 8 and 16 hours respectively from the begining. What is the area of drainage basin. Also determine the coefficient of runoff of basin. 10

UNIT - III

7. Derive a formula for discharge from a tubewell fully penetrated in a homogeneous unconfined aquifer assuming equilibrium flow conditions. 10
8. Write short notes on the following : (2.5x4=10)
- i) Drainage coefficient.
- ii) Recuperation test
- iii) Causes of water logging.
- iv) Specific capacity of well.
9. i) In a system of closed drains, the drains are placed with their centers 7.7m above the impervious stratum and the maximum height of the drained water table above the impervious stratum to be 8.0m. If the spacing between drains

is 2.5 m and discharge entering the per unit length is 4.5×10^6 cumec/m.
Find the coefficient of permeability of the soil.

5

- ii) What do you mean by land reclamation ? What are the different methods of land reclamation ?

5

UNIT - IV

10. i) What are the various investigations which are required for reservoir planning? Explain in brief.

5

- ii) Write short notes on :

(2.5x2=5)

- a) Sedimentation control in reservoir.
b) Various storage zone of reservoir.

11. Write short notes on following :

(2.5x4=10)

- a) Drip Irrigation.
b) Sprinkler Irrigation.
c) Mode of sedimentation in Reservoir.
d) Lift Irrigation Scheme.

12. The details of various proposals in a water resources development scheme are given below.

10

| Sr.No. | Proposal | Capital cost (Rs.Lakh) | Annual O, MER cost (Rs. Lakh) | Life (yrs) | Rate of Interest (%) |
|--------|--|---------------------------|-------------------------------------|------------|----------------------------|
| 1. | Large storage Reservoir | 80 | 2 | 75 | 8 |
| 2. | Storage reservoir together with pickup weir | 65 | 3 | 70 | 7 |
| 3. | Lift Irrigation Scheme | 50 | 3.5 | 40 | 9 |

Annual benefits from each of the scheme are same. Suggest the best alternative with justification.

UNIT - V

13. Define Irrigation. What is necessity of Irrigation. Also discuss benefits and ill effects of irrigation. 10
14. i) What are the various irrigation requirements ? Discuss them in brief. 5
- ii) What are the different methods of assessment of irrigation water charges. Discuss how the irrigation water charges imposed on farmers are justified. 5
15. i) The CCA of a water course is 1200 hectares. Intensities of sugar cane and wheat crops are 20% and 40% respectively. The duties for the crops at the head of the water course are 730 hect/cumec and 1800 hect/cumec respectively.
Find -
- a) Discharge required at the head of the water course.
- b) Determine the discharge at the outlet, assuming a time factor equal to 0.8. 5
- ii) After how many days will you order irrigation in order to ensure healthy growth of the crops, if
Field capacity of soil = 30%
Permanent wilting percentage = 12%
Density of soil = 13 KN/m^3
Effective depth of root zone = 0.65m
Daily consumptive use of water = 12.5mm.
- For healthy growth of plants the moisture content must not fall below 25% of the water holding capacity between the field capacity and the permanent wilting point. 5
