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B.E / B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, APR / MAY 2014

AGRICULTURAL AND IRRIGATION ENGINEERING BRANCH

VI SEMESTER – (REGULATIONS: 2008)

AI 9353 – DRAINAGE ENGINEERING and LAND MANAGEMENT

Time : 3 hours. Max Marks: 100

Answer ALL Questions

Part – A (10 x 2 = 20 Marks)

1. Define the term land drainage as per ICID.
2. Write the assumptions to describe the flow of groundwater to the drains.
3. How Kirkham equation is similar to Hooghoudt equation?
4. Compare between steady state and unsteady-state equation.
5. Write the objective of agricultural drainage system.
6. Define the term agricultural drainage criteria.
7. Give the advantage of open ditches.
8. Calculate the drainage coefficient of open ditch to drain an area of about 2000 ha of land at the rate of 4 m^3/s.
9. What do you understand by term water logging?
10. Write note on leaching process.

Part – B (5 x 16 = 80 Marks)

11. i) Describe briefly about the history of land drainage from records that is followed throughout the world. (13)
    ii). Write the need for land drainage in agricultural land (3)

12. a i) What is Hooghoudt equation and briefly derive the steady-state flow to vertically-walled drains with a neat sketch. Write the assumptions. (16)

OR

b. i) What is Glover-Dumm equation of transient flow and derive it briefly with a neat sketch. (10)

ii) In the area the drainage spacing of 90 m. The drainage system reacts to a period with some intensive rainstorms. If we assume that the WT at the start of the rainy period is 0.30 m above drain level, Use the De Zeeuw-Hellinga equation to calculate fluctuations of the WT and the corresponding discharge from the drainage system.
Where K=1.0 m/d, μ=0.05, L=90m, d=4.63 m and h_0=0.30m,
Calculate the drain discharge upto 4 days. (6)

Day	Recharge (m)
0	0.000
1	0.018
2	0.007
3	0.029
4	0.012

13. a. i) Explain the soil water balance with artificial drainage. (8)

ii) Write the benefits of drainage system. (4)
iii) Explain the impacts of poor drainage system for soil and plant. (4)

OR

b. i) Briefly describe the classification of types of agricultural drainage system with a flow chart. (12)
ii) Write the positive and negative effects owing to the drier soil condition. (4)

14. a. i) Explain the components of drainage system with a neat sketch? (6)
ii) Trapezoidal cross section of draining the area of 300 ha land. The maximum allowable flow velocity in sandy loam soil is 0.86 m/s. Consider drainage coefficient as 2 cm, drainage depth as 1.3 cm, bed slope 0.001 m/m, side slope as 2:1, Manning's constant as 0.03. Calculate the discharge and velocity. (6)
iii) Calculate drainage coefficient for open ditch systems as surface drainage for 1500 ha watershed area, if runoff is entering the watershed at the rate of 4.5 m^3/s for 24 hours period. Then the total rainfall for 24 hours duration as 8.5 cm, infiltration loss during 24 hours duration as 1.5 cm and crop water balance depth as 8 cm. (4)

OR

b. i)Write a note on a) Mole drainage b) French drains c) Ditch drainage (6)
ii) Explain the hydraulic design of open drains. (4)
iii) Briefly describe along with a sketch the layout of tile drains types. (6)

15. a i) Write the adverse effects of water logging. Differentiate between saline and alkaline soil. (6)
ii)Explain the classification of salt affected soil and choice of salt tolerance crops. (5)
iii) Estimate the leaching requirement when electrical conductivity (EC) value of a saturated extract of soil is 10 mmhos/cm at 25% reduction in the yield of a crop. The EC of irrigation water is 1.2 mmhos/cm. What will be the required depth of water to be applied to the field if the consumptive use requirement of the crop is 80 mm? EC value of the leeching water may be 20 mmhos/cm. (5)

OR

b. i) Briefly explain the different methods used saline and alkali soils reclamation and management. (16)

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