Roll.No | | | | | | | | |

(23)

B. E / B. Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS APRIL /MAY 2011

AGRICULTURAL AND IRRIGATION ENGINEERING BRANCH

SIXTH SEMESTER – (REGULATION 2004)

AI383 DRAINAGE ENGINEERING AND LAND MANAGEMENT

TIME: 3 HOURS Max Mark: 100

Answer ALL Questions

Part A (10 x 2 = 20 Marks)

1. Differentiate surface and sub-surface drainage
2. List any five benefits of drainage
3. What are the assumptions involved in Dupuit- Forchheimer Theory?
4. State the reasons for considering plane of symmetry as one of the boundary condition in drainage Engineering
5. Under what circumstances steady state theory is considered for agricultural drainage
6. What are the positive effects achieved due to discharge of water from the agricultural land?
7. Under which condition mole drains are used?
8. State the purpose of interceptor drains.
9. Write the equation for salt balance of the root zone
10. Define the term Leaching Requirement.

Part B (5 x 16 = 80 MARKS)

(Question No. 11 is compulsory)

11. a. (i) An area has a soil profile consisting of two distinct layers. Pipe drains with a diameter of 0.1 m will be installed in the top layer, 1.5 m above the interface between the two layers. We have the following data: q = 0.008m/d, h = 0.75m, K_t = 0.5m/d, K_b = 2.0m/d, D_o = 1.0m, D_b = 4.0m, r_o = 0.05m. Suggest the method and calculate the drain spacing (12)

12. a. (i) Derive an expression for the Leakage factor of the semi confined aquifer (10)

(ii)Compare the steady state and unsteady state equations and discuss the conditions in which these equations are used (6)

OR

12. b. (i) Briefly explain the applications of Darcy's equation and derive the same (8)

(ii)With the help of a diagram discuss the special drainage situations (8)

13. a (i) Explain in detail the methodologies adopted in drainage surveying before implementing any drainage systems (10)

(ii) With the help of a diagram discuss the special drainage situations (6)

OR

13. b. (i) Classify the agricultural drainage system and explain them in detail (16)

14. a. (i) Design a drainage canal to drain 550 hectares of land having a drainage coefficient of 2.5 cm. The soil is silt loam. Maximum permissible slope of channel bed is 0.1 per cent. (10)

(ii) Discuss the anti-water logging measures to make the crops survive (6)

OR

14. b. (i) Subsurface drainage is practiced in an acid sulphate clay soil for the controlled leaching of toxic salts. The area has a flat topography and rice is cultivated in bunded field. Average salt concentration of irrigation water used is $0.25dSm^{-1}$ .The salt concentration of the 1: 2 saturation extract prepared from the soil is $1.27dSm^{-1}$. The above readings were taken during November and the average rainfall of the month is 100mm. Average evapo-transpiration for the same period was 5mm per day. Calculate the monthly leaching requirement. (4)

(ii) Design a drainage channel for a catchment area of 100 ha , slope 0.45%, coefficient of runoff 0.70, intensity of rainfall 4cm/hr, coefficient of rugosity 0.025 (12)

15. a. (i) What are the various alignments of tile drainage that can be used to drain the subsurface water (10)

(ii) Salinity in relation to irrigation and drainage – discuss (6)

OR

15. b (i) Discuss in detail about the principles and design aspects of biodrainage (8)

(ii) Explain in detail the operation and maintenance of tile drains (8)