Reg.No | | | | | | | | | |

B. E (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 12

AGRICULTURAL AND IRRIGATION ENGINEERING BRANCH

SIXTH SEMESTER – (REGULATION 2008)

AI 93 53 DRAINAGE ENGINEERING AND LAND MANAGEMENT

TIME: 3 HOURS Max Mark: 100

Instructions: Necessary tables are given in the question paper

Answer ALL Questions

Part A (10 x 2 = 20 Marks)

1. Define the term 'Land Drainage'
2. Find the mass density of the material if the temperature is 40 degree Celsius
3. Write an expression for fresh water head and also calculate the freshwater column if salt water head is 30m with mass density 1025kg/m^3
4. List the practical applications of water balance analyses
5. What is meant by head controlled boundary? Give examples
6. Differentiate flow domain and time domain components of water balances
7. Define Tortousity
8. What are the various factors need to be considered in the surface drainage reconnaissance survey
9. How bio-drainage is different from conventional drainage in agricultural fields?
10. Define the term Leaching

Part B (5 x 16 = 80 MARKS)

(Question No. 11 is compulsory)

11. a. (i) A confined aquifer has a source of recharge K for the aquifer is 50 m/day, and n is 0.2. The piezometric head in two wells 1000 m apart is 55 m and 50 m respectively, from a common datum. The average thickness of the aquifer is 30 m, and the average width of aquifer is 5 km. Compute the rate of flow through the aquifer and the average time of travel from the head of the aquifer to a point 4 km downstream. A*ssume no dispersion or diffusion*

(8)

(ii) Derive the expression for total flow in the horizontal and vertical direction through the layered soils

(8)

12. a. (i) Compare the steady state equations based on the soil profile and position of the drain (8)

(ii) In an agricultural area, high watertables occur. A subsurface drainage system is to be installed to control the water table under the design discharge of 1 mm/day with the depth of the water table midway between the drains is to be kept at 1 m below the soil

(ii) The average annual rainfall of 7 rain gauges in a basin is 537, 490, 541, 449, 412, 618 and 545 mm respectively. How many additional gauges are required if it is desired to limit the error to only 10%? **(6)**

(OR)

(b) (i) Explain with neat sketch about working principle of double ring infiltrometer and obtain the Horton's equation. **(6)**

(ii) How is precipitation measured? Discuss the various methods available for the spatial computation of average rainfall over a basin. **(10)**

13. (a) A runoff data at a stream gauge station for a flood are given below in the table; Drainage area is 42 km^2. If the duration of rainfall is 3 hours, derive a 3 hours unit hydrograph for the basin. **(16)**

Time (hrs)	0	3	6	9	12	15	18	21
Total Runoff (m^3/s)	50	47	75	120	225	290	270	145
Base flow (m^3/s)	50	47	46	45	45	45	46	48
Time (hrs)	24	27	30	33	36	39	42	45
Total Runoff (m^3/s)	110	90	80	70	60	55	51	50
Base flow (m^3/s)	50	53	54	57	60	55	51	50

(OR)

(b) (i) Elaborate the climatic and physiographic factors affecting the runoff. **(8)**

(ii) Explain the various methods that are used to measure the river water velocity. **(8)**

14. (a) (i) Explain the different zones of reservoir with a neat sketch **(8)**

(ii) How to select the best location for a large reservoir? **(8)**

(OR)

(b) Write short note on the following

(i) Cross drainage works **(8)**

(ii) Canal alignment **(8)**

15. (a) Explain with neat sketch, the different types of sub-surface geological formation and give one example for each formation. **(16)**

(OR)

(b) Elaborate the importance of rainwater harvesting in rural and urban areas and explain its types with suitable sketch. **(16)**