Iden 3108   Drainage Engineering (1+1)

Marks: 50

Time: 2 hours

I   **Fill up the following**   (10x1=10)

1   Most crops will grow and respire normally if the oxygen diffusion rates exceeds _____g/cm^2/min.

2   _____are earthen embankments used along the streams to prevent flooding of adjoining areas.

3   Relief drains are oriented _____ to the direction of groundwater flow.

4   Recommended side slopes for drainage ditch in sandy loam soils is _____

5   Minimum diameter of observation well is _____cm.

State whether following statements are true or false

6   Stream lines are always Parallel to isobaths.

7   Intrinsic permeability depends on properties of both media and fluid.

8   Unlined drainage ditches can also be used for subsurface drainage.

9   Filters are recommended for SSD in case of non-cohesive soils with clay content less than 40 %.

10   In gridiron system of SSD, laterals meet the main from both the sides.

II   **Write Short notes on any FIVE of the following**   (5x2=10)

1   Anthropogenic causes of water logging.

2   Benefits of subsurface drainage.

3   Define "Leaching requirement". State the equation to compute Leaching Requirement.

4   Explain Rational Method for the computation of peak discharge through the drains.

5   Classify the salt affected soils based upon pH, ECe and ESP.

6   Explain French Inlet with neat sketch.

7   State and explain the salt balance equation for irrigated lands with neat sketch.

III   **Answer any FIVE of the following.**   (5x4=20)

1   Derive Hooghoudt's equation for the spacing the drains.

2   Special types of drainage systems.

3   Drainage Investigations.

4   Laboratory methods for the measurement of soil permeability.

5   Filters for tile drains.

6   Explain how to drain (a) Saline Soil and (2) Alkaline Soil

7   Explain drainage coefficient in detail.

Drainage coefficient of an area is 6.6 cm. The catchment area is 6 sq. km. Design a main open drain with bed slope of 0.1 %, assuming the value of Manning's n to be 0.03. Type of soil permits the side slope of 1.5:1. Depth of the drain at outlet cannot exceed 1.5 m based upon the area topography and elevation of outlet.

IV   **Answer any ONE of the following**   (1x10=10)

1   Different Surface Drainage Systems with neat sketches.

2   Explain all the steps for designing the open ditch system with neat sketch

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