Iden.3108   **Drainage Engineering (1+1)**

Marks: 50
Time: 2 hours

I   **Match the following**   **(10x1=10)**

1.	Saline soil	A. Tube-well drainage
2.	Alkali soil	B. Cluster of plants
3.	Saline alkali soils	C. Tile drainage
4.	Waterlogged area	D. Mole drainage
5.	Potential area for water logging	E. EC > 4 ds/m & ESP < 15%
6.	Safe area	F. Watertable between 2-3 m from land surface
7.	Vertical subsurface drainage system	G. EC < 4 ds/m & ESP > 15%
8.	Horizontal subsurface drainage system	H. Watertable below 3 m from land surface
9.	Bio-drainage system	I. EC > 4 ds/m & ESP > 15%
10.	Pipe-less drainage system	J. Watertable within 2 m. from land surface

II   **Write short notes on ANY FIVE of the following**   **(5x2=10)**
1. Explain the Man-made causes of water logging.
2. Write short note on land forming.
3. Explain the vertical drainage system using dug well.
4. Explain the random field drains system.
5. Write short note on drainable porosity.
6. Write short note on bio-drainage.
7. Differentiate between horizontal and vertical sub-surface drainage.

III   **Answer ANY FIVE of the following**   **(5x4=20)**
1. Explain the different layout of pipe/tile drain with neat sketch.
2. Define subsurface drainage and explain the benefits of subsurface drainage.
3. Explain the mole drainage system with neat sketch.
4. Explain the reclamation process of saline soils.
5. Explain the pipe materials and its selection criteria for pipe drainage.
6. Explain the different methods of surface drainage for flat land.
7. Enlist the methods for determining drainage coefficient and explain any one briefly.

IV   **Write an essay on ANY ONE of the following**   **(1x10=10)**
1. Derive the Hooghoudt's steady state drain spacing equation for homogenous soil profile.
2. Define drain envelope. Explain its requirement, design criteria, functions and general design procedure.