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Reg. No

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Seventh Semester – Supplementary) Examinations, November – 2023

BPCAG7030 - Drainage Engineering

(Age)

Time: 3 hrs
Maximum: 70 Marks

Answer ALL Questions
The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)
(1 x 10 = 10 Marks)

Q.1. Answer *ALL* questions
[CO#] [PO#]

a. Waterlogging is caused by
CO1   PO1
   (i)   Excess Rainfall   (ii)   Poor internal Drainage
   (iii)   Poor internal Drainage   (iv)   All of the above

b. Waterlogging is caused by
CO1   PO1
   (v)   Excess Rainfall   (vi)   Poor internal Drainage
   (vii) Poor internal Drainage   (viii) All of the above

c. ------------------ also facilitates the growth of toxins and other injurious substances
CO2   PO1
   (i)   Poor aeration   (ii)   Temperature
   (iii)   humidity   (iv)   None of the above

d. Area is called water logged when Water table is within _____ from the land surface
CO1   PO1
   (i)   2m   (ii)   5m
   (iii)   6m   (iv)   10m

e. The physical effects of water logging are:
CO1   PO1
   (i) Lack of aeration in the root zone,   (ii)   Difficulty in soil workability
   (iii) Deterioration of soil structure.   (iv)   All of the above

f. The main causes of soil salinity and alkalinity are:
CO4   PO1
   (i) Irrigation mismanagement;   (ii) Poor land leveling;
   (iii) soil compaction   (iv) All of the above

g. Crop production is exclusively dependent upon rainfall in _____
CO1   PO1
   (i)   Arid region   (ii)   Semi-Arid region
   (iii)   Rainfed Region   (iv)   None of the Above

h. Type of Surface Drainage Systems is
CO2   PO1
   (i)   Mole drainage   (ii)   Tile drainage
   (iii)   Vertical drainage   (iv)   Random drains

i. Which is a type of surface drainage system:
CO2   PO1
   (i) Random drain system   (ii) Bedding system
   (iii) Parallel field drain system   (iv) All of the above

j. A method of drainage that is used in high water table areas, hilly areas, having open drain collection to common field outlet under the surface is_____
CO2   PO1
   (i)   Open channel   (ii)   Tile drainage
   (iii)   Gravity outlet   (iv)   Parallel drains

PART – B: (Short Answer Questions)   **(2 x 10 = 20 Marks)**
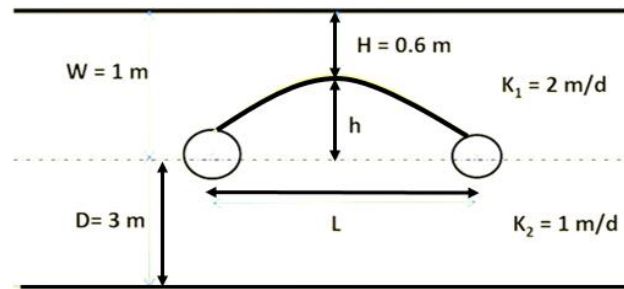
Q.2. Answer ***ALL*** questions   [CO#]   [PO#]

a.	Define Water Logging in Agricultural field.	CO1	PO1
b.	Write the Objectives of Drainage.	CO2	PO1
c.	What are the adverse effect of water logging in agricultural field?	CO1	PO1
d.	Enlist the software's used in drainage design.	CO2	PO2
e.	Write the short notes on Consumptive use of Water	CO4	PO1
f.	Enlist the types of outlets for pipe drainage system.	CO3	PO1
g.	Differentiate between Arid, Semi-Arid and Rainfed area.	CO1	PO1
h.	What is the Purpose of Subsurface Drainage?	CO3	PO1
i.	Classify the salt affected soil. Also define Acid soil.	CO4	PO1
j.	Enlist the types of outlets for pipe drainage system.	CO3	PO1

PART – C: (Long Answer Questions)   **(10 x 4 = 40 Marks)**

Answer ***ALL*** questions   Marks   [CO#]   [PO#]

		Marks	[CO#]	[PO#]
3. a.	Define Land Grading and Land Smoothing. Also Enlist various types of surface drainage system.	5	CO2	PO1
b.	Explain the different ways to prevent the water logging problem.	5	CO1	PO1
	(OR)			
c.	What are the different types of surface drainage system? Explain any two types of surface drainage system.	5	CO2	PO1
d.	Write about the components in designing the surface drainage system.	5	CO2	PO1
4. a.	An agricultural soil contains 40% pore space, and the moisture content after gravity drainage is 40% (by volume). Find the void ratio, drainable porosity, and drainable water volume from a 20m × 15m plot having 1.0m root zone depth.	5	CO2	PO2
b.	A watershed of 1200 hectares is discharging through a drain at an average ratio of 2.5 m3/s. Calculate the drainage coefficient. If the drainage coefficient is 4 cm, what would be the discharge through the drain?	5	CO2	PO3
	(OR)			
c.	Define the followings: (i) Mole Drainage (ii) Bio-Drainage	5	CO3	PO1
d.	An agricultural soil contains 47% pore space, and the moisture content after gravity drainage is 39% (by volume). Find the void ratio, drainable porosity, and drainable water volume from a 20m × 15m plot having 1.0m root zone depth.	5	CO2	PO3
5. a.	In a subsurface drainage network, 10 lateral drains laid at a spacing of 30 m and each 200m long, join a collector drain. The average discharge at the outlet of the collector drain was 10L/s when the water table dropped from ground surface to 40 cm below the ground surface in 3days. Find (i) the average drainable porosity of the soil and (ii) Define Field Capacity, and Wilting Point.	5+3	CO3	PO2
b.	The depth from soil surface to subsurface tile drains, impermeable soil layer and the highest water tables are measured as 4 m, 6.0m and 1.2 m respectively. What is the effective hydraulic head for drainage in meter?	2	CO3	PO3
	(OR)			

c. Write the assumptions of Ernst Equation and Hooghoudt's Equation. 4 CO3 PO2

d. Tile drains have to be installed in the agricultural land having soil permeability 6 CO3 PO3
2.3×10^3 mm/sec. An impervious strata exist at 3.2 m below land surface and it is desirable to keep water level 1m below land surface. Average discharge is 2mm/day. If tile drains are planned to be placed 1.5 m below land surface. Determine the Drain spacing assuming equivalent depth to be same as tile depth.

6. a. Determine the required drain spacing for the basic design criteria q = 7mm/day, 6 CO3 PO3
H = 0.6m, pipe with OD = 0.2m and u = 0.3m.

b. Write the short notes on leaching requirement. 4 CO4 PO1

(OR)

c. Derive the below Hooghoudt Equation $q = \frac{8KDh + 4Kh^2}{L^2}$ for determining the drain 6+2 CO3 PO3
spacing. Also write the assumptions considered in Hooghoudt's Equations.

d. The depth from soil surface to subsurface tile drains, impermeable soil layer and the highest water tables are measured as 3.2 m, 5.0m and 0.8m respectively. What is the effective hydraulic head for drainage in meter? 2 CO3 PO3

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