

Reg.No.:



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 150001

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025

Third Semester

Agricultural Engineering

U23AG301 - BASICS OF SOIL SCIENCE AND ENGINEERING

(Regulation 2023)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Mention any two factors of soil formation.	2	K1	CO1
2.	State the importance of soil taxonomy.	2	K2	CO1
3.	Differentiate between macro-organisms and micro-organisms.	2	K2	CO2
4.	List any two components of soil organic matter.	2	K1	CO2
5.	Mention one field method and one laboratory method of compaction testing.	2	K1	CO3
6.	Define plastic limit and liquid limit.	2	K1	CO3
7.	State any two factors affecting shear strength of soil.	2	K2	CO4
8.	Mention two advantages of the triaxial compression test over the direct shear test.	2	K2	CO4
9.	Differentiate between infinite slope and finite slope.	2	K2	CO5
10.	Define bearing capacity factors (N_c , N_q , N_γ).	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	Describe soil genesis and the process of soil formation.	13	K1	CO1
(OR)				
b)	Discuss the physical properties of soils. Explain how these properties influence water retention and plant growth.	13	K1	CO1

12.	a)	Describe the composition and properties of soil organic matter.	13	K2	CO2
		(OR)			
	b)	Explain the concept of ion exchange in soils.	13	K2	CO2
13.	a)	Discuss the Engineering Classification of Soils using Indian Standard Classification System (ISCS) and explain the criteria for coarse-grained and fine-grained soils with examples.	13	K2	CO3
		(OR)			
	b)	A sample of soil weighs 1.85 kg when moist and 1.65 kg when oven-dried. The volume of the sample is 950 cm ³ . Specific gravity, G=2.7, Water content w=15%, Void ratio e=0.65. Find: a)Water content b)Bulk density c)Dry density d) Degree of saturation e)Saturated and submerged unit weight.	13	K2	CO3
14.	a)	Explain in detail the laboratory methods for measuring shear strength of soils.	13	K2	CO4
		(OR)			
	b)	Describe the laboratory and field methods for determining permeability.	13	K2	CO4
15.	a)	Analyze finite slopes using the Friction Circle Method.	13	K3	CO5
		(OR)			
	b)	Describe the different types of shallow foundations with neat sketches.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16.	a) A farmer complains that a field retains water after irrigation for too long. Analyze the problem using soil texture, structure, and porosity concepts. Suggest practical interventions to improve drainage. Predict how the changes will affect root growth and crop yield.	15	K1	CO1
	(OR)			
	b) Analyze and give suitable recommendations for the following case study: A 5-hectare clay loam field has low organic matter (0.8%), acidic pH (5.2), moderate CEC (15 cmol(c)/kg), and base saturation of 40%. Crop growth is poor, drainage is inadequate, and soil organism activity is low.	15	K2	CO2