

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-GURUJADA VIZINAGARAM
III B. Tech I Semester Regular Examinations November -2025
GEO TECHNICAL ENGINEERING
(Civil Engineering)

Time: 3 hours

Max. Marks: 70

The Question paper consists of Part A & Part B.

Part A is compulsory, Answer all questions. Part B Answers any one question from each unit.

1		PART-A	(20Marks)
	a)	List the names of three important clay minerals	[2]
	b)	Explain Geological cycle,	[2]
	c)	Define equipotential line. What is the name of the topmost flow line of an earth dam	[2]
	d)	Define permeability.	[2]
	e)	Define pore pressure and how to measure it?	[2]
	f)	Define effective pressure and how to measure it?	[2]
	g)	What is field compaction control?	[2]
	h)	What is coefficient of consolidation?	[2]
	i)	Explain different drainage conditions for shear testing of soils.	[2]
	j)	What is total shear strength and effective shear strength?	[2]
		PART-B	(50Marks)
		Question from Unit - I	
2	a)	What are the two basic structural units of clay minerals? Explain them.	[5]
	b)	What is meant by consistency of soils? Define all the Atterberg limits	[5]
		(OR)	
3	a)	Explain I.S soil classification.	[5]
	b)	The following results were recorded in a shrinkage limit test using mercury Mass of container =17.0g Mass of wet soil and container =72.30g Mass of dish =132.40g Mass of dish and displaced mercury =486.10g Mass of dry soil and container =58.20g Volume of wet soil =32.4 cm ³ Determine the shrinkage limit, the linear shrinkage and the shrinkage ratio. The density of mercury is 13.6g/cm ³	[5]
		Question from Unit - II	
4	a)	Write the relationship between discharge velocity and seepage velocity and also state Darcy's law.	[5]
	b)	A falling head permeability test is to be performed on a soil sample whose coefficient of permeability is 3×10^{-5} cm/s. What diameter of the standpipe should be used if the head is to drop from 27.5cm to 20.0cm in 5 minutes and if the crosssectional area and length of the sample are respectively 15cm ² and 8.5cm?	[5]
		(OR)	

5	a)	Explain Flow nets, their Characteristics and Uses.	[5]
	b)	In order to compute the seepage loss through the foundation of a cofferdam, flownets were constructed. The result of the flownet study gave $N_f = 6$, $N_d = 16$. The head of water lost during seepage was 19.68m. If the hydraulic conductivity of the soil is $k = 13.12 \times 10^{-5}$ m/s, compute the seepage loss per metre length of dam per day.	[5]
		Question from Unit - III	
6	a)	Explain Total, Neutral and Effective Stresses.	[5]
	b)	A 6-m thick layer of stiff saturated clay is underlain by a layer of sand (Figure 3). The sand is under artesian pressure. Calculate the maximum depth of cut H that can be made in the clay.	[5]
		(OR)	
7	a)	Explain Stresses When Flow Takes Place Through the Soil from Top to Bottom	[5]
	b)	Determine total, neutral, and effective stress at a depth of 16m below the ground. The water table is 4m below the ground level. Take $\gamma_{\text{bulk}} = 16.5 \text{ kN/m}^3$, and $\gamma_{\text{sat}} = 19.4 \text{ kN/m}^3$.	[5]
		Question from Unit - IV	
8	a)	Define 'preconsolidation pressure'. In what ways is its determination important in soil engineering practice?	[5]
	b)	, Differentiate between compaction and consolidation.	[5]
		(OR)	
9	a)	What are the assumptions in Terzaghi's 1-D Consolidation theory?	[5]
	b)	What are the different field compactions methods.	[5]
		Question from Unit - V	
10	a)	Explain shear box test with neat figure.	[5]
	b)	Samples of compacted, clean, dry sand were tested in a shear box, 6 cm \times 6 cm, and the following observations were recorded: Normal load (N): 100 200 300 Peak shear load (N): 90 180 270 Ultimate shear load (N): 75 150 225 Determine the angle of shearing resistance in (i) the dense state and in (ii) the loose state.	[5]
		(OR)	
11	a)	Explain the Mohr-Coulomb strength envelope. What is the effect of pore pressure in strength of soils?	[5]
	b)	What are the advantages and applications of triaxial compression test?	[5]
