



PRESIDENCY UNIVERSITY

BENGALURU

Roll No.														
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End - Term Examinations – MAY 2025

Date: 28-05-2025

Time: 01:00 pm – 04:00 pm

School: SOE	Program: B. Tech-CIV	
Course Code: CIV2015	Course Name: Geotechnical Engineering	
Semester: IV	Max Marks: 100	Weightage: 50%

CO - Levels	C01	C02	C03	C04	C05
Marks	26	48	26		

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.

10Q x 2M=20M

1.	Explain degree of saturation and moisture content of soil.	2 Marks	L2	C01
2.	List any four major soil deposits of India.	2 Marks	L1	C01
3.	Explain the term specific gravity of soil solids.	2 Marks	L2	C01
4.	Explain the term permeability of soil.	2 Marks	L2	C02
5.	List the various methods of finding the coefficient of permeability of soil.	2 Marks	L1	C02
6.	Explain effective stress of soil.	2 Marks	L2	C02
7.	If effective stress is 400 kPa and neutral stress is 100 kPa then what is the value of total stress.	2 Marks	L1	C02
8.	Explain the term compressibility of soil.	2 Marks	L2	C03
9.	List the laboratory tests which are conducted to determine the optimum moisture content and maximum dry density of soil.	2 Marks	L1	C03
10.	Explain the term Initial consolidation of soil.	2 Marks	L2	C03

Part B

Answer the Questions.

Total Marks 80M

11.	a.	Geometrical arrangement of soil particles with respect to one another is known as soil structure. Explain the structure of soil with a neat sketch.				15 Marks	L2	CO 1	
	b.	In an in-situ density test on a soil, the mass of wet soil in the mould was 1.855 kg and the volume of the mould was 0.945 liters. The water content of the soil was 16%. Calculate the dry density, void ratio, Degree of saturation and percentage air voids. Take $G=2.68$.				5 Marks	L3	CO 1	
Or									
12.	a.	Explain various consistency limits of soil with a neat sketch.				6 Marks	L2	CO 1	
	b.	The following data gives the results of liquid limit of soil. Calculate Liquid limit, Flow Index of the soil.				14 Marks	L3	CO 1	
		No of blows (N)	34	24	18				12
		Water content (%)	44.6	49.4	51.4				55.6
13.	a.	Explain Darcy's law with its assumptions and validity.				10 Marks	L2	CO 2	
	b.	Permeability test has been conducted for a soil sample from a construction site at Delhi and following are the experimental data-sample height is 10 cm, cross sectional area is 50 square centimeter, if a quantity of water of 450 ml is passed down in 10 min under a constant head of 40 cm calculate permeability of soil. On oven drying, the soil has a mass of 498 g, $G=2.65$ and also calculate seepage velocity during the test.				10 Marks	L3	CO 2	
Or									
14.	a.	Develop the relationship between discharge velocity and seepage velocity and also list the difference between them.				10 Marks	L2	CO 2	
	b.	The diagram shown below is the profile of the ground at a construction site at Rajanukunte from soil investigation report. Calculate and plot the total stress, pore water pressure and effective stress diagram for the soil profile shown in Figure.				10 Marks	L3	CO 2	
15.	a.	Draw the Moh'r coulomb failure envelope for pure cohesive soil, cohesion less soil and for the soil having both cohesion and angle of friction.				6 Marks	L2	CO 2	
	b.	A series of direct shear tests were conducted on a soil at a construction site at Yelahanka and each test was carried out till				14 Marks	L3	CO 2	

	<p>the sample failed. The following results were obtained and are tabulated below. Calculate cohesion and angle of shearing resistance for the soil sample.</p> <table><tr><th>sample No</th><th>Normal Stress (kN/m²)</th><th>Shear stress (kN/m²)</th></tr><tr><td>1</td><td>15</td><td>18</td></tr><tr><td>2</td><td>30</td><td>25</td></tr><tr><td>3</td><td>45</td><td>32</td></tr></table>	sample No	Normal Stress (kN/m ²)	Shear stress (kN/m ²)	1	15	18	2	30	25	3	45	32			
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2	30	25														
3	45	32														

Or

16.	a.	<p>The following results were obtained from a series of consolidated undrained triaxial shear test on a soil sample procured from Kolar, in which the pore water pressure was not determined. Calculate the cohesion intercept and the angle of shearing resistance from the graph.</p> <table><tr><td>sample No</td><td>Confining Pressure (kn/m²)</td><td>Deviator stress (kN/m²)</td></tr><tr><td>1</td><td>100</td><td>600</td></tr><tr><td>2</td><td>200</td><td>750</td></tr><tr><td>3</td><td>300</td><td>870</td></tr></table>	sample No	Confining Pressure (kn/m ²)	Deviator stress (kN/m ²)	1	100	600	2	200	750	3	300	870	20 Marks	L3	CO 2
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17.	a.	Compaction is an artificial process of densification of soil where air is expelled from the soil. Explain the various factors affecting compaction.	16 Marks	L2	CO 3
	b.	Explain the terms compaction and consolidation of soil.	4 Marks	L2	CO 3

Or

18.	a.	Explain Mass spring analogy of soil consolidation with a neat diagram.	15 Marks	L2	CO 3
	b.	Draw the compaction curve and show the salient points in it.	5 Marks	L2	CO 3