

Code: 20CE6502

III B.Tech - I Semester - Regular Examinations - NOVEMBER 2024

**ENVIRONMENTAL GEOTECHNIQUES
(HONORS in CIVIL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.

2. All parts of Question must be answered in one place.

BL – Blooms Level

CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Why are the soils containing montmorillonite often expansive in nature whereas soils containing illite or kaolinite are not?	L2	CO1	7 M
	b)	Explain the terms i. Specific surface area ii. Diffuse double layer iii. Adsorbed water iv. Cation exchange capacity of soil	L2	CO1	7 M
OR					
2	a)	An inorganic clay has a liquid limit of 450% i. What is the most predominant mineral in this soil? ii. Explain high liquid limit in terms of crystal structure of this mineral.	L3	CO1	7 M

	b)	Support your answers to parts (a) to (c) with sketches. i. Explain changes in hydraulic conductivity (k) based on micropore and macropore theories. ii. How is k influenced by clay mineralogy? iii. For the same relative compaction, how will k change with compaction moisture content?	L2	CO1	7 M
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UNIT-II

3	a)	Explain the diffused double layer (DDL) of expansive clay. What are the different factors affect the DDL thickness?	L2	CO2	7 M
	b)	What is free swell index? Explain the testing procedure to determine the free swell index of soil.	L2	CO2	7 M

OR

4	a)	Discuss the significance of pore water pressure in triaxial shear test? Explain the pore pressure parameters as given by A.W. Skempton.	L2	CO2	7 M
	b)	What are the assumptions in Terzaghi's one-dimensional consolidation theory? Explain any two methods to determine the coefficient of consolidation.	L2	CO2	7 M

UNIT-III					
5	a)	What are the major components of engineered landfill?	L2	CO3	7 M
	b)	What are the chemical and geo-technical properties of MSW? List its typical values.	L2	CO3	7 M
OR					
6	a)	Describe in detail factors need to be considered for landfill site characterization and steps to be followed for landfill site selection.	L2	CO3	7 M
	b)	How do you consider a suitable site for the construction of landfill in your locality?	L2	CO3	7 M
UNIT-IV					
7	a)	Explain the differences in compacted clay liners (CCLs) and geosynthetic clay liners (GCLs).	L2	CO4	7 M
	b)	How are the gases in landfill generated? What is the typical composition of landfill gas?	L2	CO4	7 M
OR					
8	a)	What are the primary components of a leak-detection system in a landfill?	L2	CO4	7 M
	b)	What are the requirements of compacted clay liners?	L2	CO4	7 M

UNIT-V

9	a)	What are the key design criteria that must be considered when designing a landfill?	L2	CO5	7 M
	b)	Compare the thermal remediation & pump and treat methods for treating MSW in landfills.	L2	CO5	7 M

OR

10	a)	Discuss how external dynamic forces can affect the performance of a landfill.	L2	CO5	7 M
	b)	Explain the terms i. Phytoremediation ii. Bioremediation	L2	CO5	7 M