

Code: 20CE6502

**III B.Tech - I Semester - Regular Examinations - NOVEMBER 2023**

**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
<b>UNIT-I</b>					
1	a)	Discuss in detail the following types of bonding agents found with clay minerals and mention the name of the minerals containing each of the following bonds. i) Hydrogen bond ii) Covalent bond iii) Van der Waals' forces	L1	CO1	7 M
	b)	Discuss in detail about soil-water-contaminant interaction.	L2	CO1	7 M
<b>OR</b>					
2	a)	Explain about the scope of Geoenvironmental Engineering with reference to soil physics, soil chemistry, hydrogeology, and biological processes.	L1	CO1	7 M
	b)	Explain about the structure and composition of the following clay minerals. Mention the differences between them. Show the	L2	CO1	7 M

	structure in symbolic form (i) Montmorillonite (ii) Illite (iii) Kaolinite (iv) Chlorite			
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### UNIT-II

3	a)	Compute the diffusive mass flux of Chloride through the vertical clay wall AB shown in Figure. Assume one-dimensional flow only. Permeability of clay is $10^{-9}$ m/sec and the Effective Diffusion Coefficient is $0.9 \times 10^{-9}$ m <sup>2</sup> /sec. Porosity of clay is 0.35.	L1	CO2	7 M
	b)	What factors can affect degree of consolidation? How do you find the degree of consolidation?	L2	CO2	7 M

### OR

4	a)	Differentiate between UU, CU, and CD tests.	L2	CO2	7 M
	b)	Explain in detail about: (i) Swelling potential and (ii) Compressibility	L1	CO2	7 M

### UNIT-III

5	a)	Discuss the need for contaminated site characterization.	L2	CO3	7 M
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	b)	Mention the site characterization techniques of a contaminated site and explain any two in detail.	L1	CO3	7 M
<b>OR</b>					
6	a)	With a neat sketch, explain the components of landfill and their functions.	L1	CO3	7 M
	b)	What are the requirements of clay barrier system?	L2	CO3	7 M
<b>UNIT-IV</b>					
7	a)	Explain in detail about slope stability analysis of infinite slopes.	L1	CO4	4 M
	b)	Explain in detail about single and double liners systems for landfills.	L2	CO4	10 M
<b>OR</b>					
8	a)	Determine the Taylor stability factor for the c-phi soils.	L3	CO4	6 M
	b)	Explain in detail about determination of factor of safety for the landfill slopes.	L3	CO4	8 M
<b>UNIT-V</b>					
9	a)	What are the mechanisms and steps to be considered in design of a landfill liners?	L3	CO5	7 M
	b)	How the free vibration of a single degree of freedom system is designed? What are the reasons for studying the vibration of SDOD system in landfill?	L4	CO5	7 M
<b>OR</b>					

10	a)	In detail explain about critical damping, overdamped and under damped that occurs in landfills.	L4	CO5	6 M
	b)	Differentiate between Thermal, Phyto and Electro-kinetic remediation techniques.	L3	CO5	8 M