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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Civil Engineering

Semester End Examination; July - 2023

Ground Improvement Techniques

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Apply the knowledge of Geology & Geotechnical Engineering in Ground improvement techniques.

CO2: Analyze Mechanical Modification Techniques for soils.

CO3: Investigate chemical modification techniques for soils.

CO4: Select appropriate geo-synthetics and grouting methods for ground Improvements for sustainability.

***Note: I) PART - A** is compulsory. **Two** marks for each question.*

***II) PART - B**: Answer any **Two** sub questions (from a, b, c) for a Maximum of **18 marks** from each unit.*

Q. No.		Questions	Marks	BLs	COs	POs
		I : PART - A	**10**			
1	a.	Define any two main objectives of soil improvement.	2	L1	CO1	PO1
	b.	In short define pre-fabricated vertical drain.	2	L1	CO2	PO2
	c.	Name different class of fly ash used for soil stabilization.	2	L1	CO3	PO4
	d.	List the materials used for grouting techniques.	2	L1	CO3	PO4
	e.	Define geo synthetics.	2	L1	CO4	PO7
		II : PART - B	**90**			
		UNIT - I	**18**			
2	a.	Describe important factors to be considered in the selection of the best soil improvement technique.	9	L2	CO1	PO1
	b.	The following are the results of a standard compaction test performed on a sample of soil: W% 7.7 11.5 14.6 17.5 19.7 21.2 M(Kg) 1.7 1.89 2.03 1.99 1.96 1.92 If the volume of the mould used was 950 cc and specific gravity was 2.65. Make necessary calculations and plot the water content-dry density curve and obtain the optimum water content and maximum dry density along with Z Av line and 80% saturation line.	9	L2	CO1	PO1
	c.	Describe in detail field equipments used for compaction in shallow and deep compaction.	9	L2	CO1	PO1
		UNIT - II	**18**			
3	a.	Describe the following: i) Multi stage well point ii) Vacuum dewatering along with discharge equations	9	L2	CO2	PO2,3

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b.	Describe preloading technique, vertical drains and sand drains.	9	L2	CO2	PO2,3
c.	With neat sketches, explain electro kinetic dewatering system.	9	L2	CO2	PO2,3
	UNIT - III	**18**			
4 a.	Describe the terms line and bitumen stabilization and compare both along its merits and demerits.	9	L2	CO3	PO2
b.	Briefly describe the effect of cement stabilization on permeability.	9	L2	CO3	PO2
c.	Describe the suitability, process and criteria for line stabilization.	9	L2	CO3	PO3
	UNIT - IV	**18**			
5 a.	List the different types of grouting and in detail explain compaction grouting along with its merits and demerits.	9	L2	CO3	PO7
b.	Write a short note on; i) Anchors ii) Rock bolts iii) Soil nailing	9	L2	CO3	PO7
c.	Explain the construction procedure of soil nailing.	9	L2	CO3	PO7
	UNIT - V	**18**			
6 a.	Name the important engineering properties of Geosynthetics along with that how are Geosynthetics are tested for assessing these properties?	9	L2	CO4	PO2
b.	Describe in detail the necessity and use of Geosynthetics as a reinforcement material in ground improvement techniques.	9	L2	CO4	PO2
c.	Describe the uses of following Geosynthetics: i) Woven Geosynthetics ii) Non-woven Geosynthetics iii) Knitted Geosynthetics iv) Bio-degradable Geosynthetics v) Three dimensional mats	9	L2	CO4	PO2

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