



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 / Aug. - 2022

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 | | | | | | | | | | | | | | | | | |
| I a. | Define ground improvement technique. | 2 | L1 | CO1 | PO1 | | | | | | | | | | | | | | |
| b. | Mention the different methods of dewatering. | 2 | L1 | CO2 | PO2 | | | | | | | | | | | | | | |
| c. | What is chemical modification? | 2 | L1 | CO3 | PO4 | | | | | | | | | | | | | | |
| d. | List the applications of Grouting. | 2 | L1 | CO3 | PO4 | | | | | | | | | | | | | | |
| e. | Mention the difference between woven and non-woven geo textile. | 2 | L1 | CO4 | PO7 | | | | | | | | | | | | | | |
| II : PART - B | | 90 | | | | | | | | | | | | | | | | | |
| UNIT - I | | 18 | | | | | | | | | | | | | | | | | |
| 1 a. | Explain the effect of compaction on engineering properties of soil. | 9 | L2 | CO1 | PO1 | | | | | | | | | | | | | | |
| b. | Discuss the factors to be considered in the selection of most suitable ground modification technique. | 9 | L2 | CO1 | PO1 | | | | | | | | | | | | | | |
| c. | The results of compaction test on a soil are given below. Plot the dry unit weight versus moisture conduct curve and determine the maximum dry unit weight and corresponding optimum moisture content. If the particle specific gravity is 2.68, determine the air void percentage at maximum dry unit weight. | 9 | L3 | CO1 | PO1 | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <tr> <td style="text-align: center;">Moisture content (%)</td> <td style="text-align: center;">9.0</td> <td style="text-align: center;">10.2</td> <td style="text-align: center;">12.5</td> <td style="text-align: center;">13.4</td> <td style="text-align: center;">14.8</td> <td style="text-align: center;">16.0</td> </tr> <tr> <td style="text-align: center;">Buck unit Weight kN/m³</td> <td style="text-align: center;">19.23</td> <td style="text-align: center;">20.51</td> <td style="text-align: center;">22.20</td> <td style="text-align: center;">22.20</td> <td style="text-align: center;">21.79</td> <td style="text-align: center;">20.96</td> </tr> </table> | | Moisture content (%) | 9.0 | 10.2 | 12.5 | 13.4 | 14.8 | 16.0 | Buck unit Weight kN/m ³ | 19.23 | 20.51 | 22.20 | 22.20 | 21.79 | 20.96 | | | | |
| Moisture content (%) | 9.0 | 10.2 | 12.5 | 13.4 | 14.8 | 16.0 | | | | | | | | | | | | | |
| Buck unit Weight kN/m ³ | 19.23 | 20.51 | 22.20 | 22.20 | 21.79 | 20.96 | | | | | | | | | | | | | |
| UNIT - II | | 18 | | | | | | | | | | | | | | | | | |
| 2 a. | Discuss, how preloading and vertical drains influence the settlement in soil? | 9 | L3 | CO2 | PO2 | | | | | | | | | | | | | | |
| b. | What are all the essential steps involved in the designing of dewatering system? | 9 | L2 | CO2 | PO2 | | | | | | | | | | | | | | |
| c. | Define dewatering. With a neat sketch explain vacuum dewatering system. | 9 | L2 | CO2 | PO2 | | | | | | | | | | | | | | |

UNIT - III**18**

- | | | | | | |
|------|---|---|----|-----|-----|
| 3 a. | With a neat sketch, explain soil-lime reaction mechanism. | 9 | L2 | CO3 | PO2 |
| b. | Explain different construction methods adopted in cement stabilization. | 9 | L2 | CO3 | PO2 |
| c. | Explain how the engineering properties of soil are changed by the process of bituminous stabilization. Mention its merits and demerits. | 9 | L2 | CO3 | PO2 |

UNIT - IV**18**

- | | | | | | |
|------|--|---|----|-----|-----|
| 4 a. | With a neat sketch, explain jet grouting. | 9 | L2 | CO3 | PO7 |
| b. | Explain basic principle of reinforced earth. | 9 | L2 | CO3 | PO7 |
| c. | Briefly discuss about rock bolts and soil nailing. | 9 | L2 | CO3 | PO7 |

UNIT - V**18**

- | | | | | | |
|------|---|---|----|-----|-----|
| 5 a. | Explain in details functions of Geo synthetics. | 9 | L3 | CO4 | PO2 |
| b. | List the properties of geo synthetics and mention its applications. | 9 | L2 | CO4 | PO2 |
| c. | Explain the types of Geo synthetics briefly. | 9 | L2 | CO4 | PO2 |

* * * *