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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations – JANUARY 2025** |
| Date: 07 – 01- 2025 Time: 09:30 am – 12:30 pm |

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| **School:** School of Engineering | **Program:** B. Tech-CIV | |
| **Course Code :**CIV3029 | **Course Name :** Ground Improvement Techniques | |
| **Semester**: VII | **Max Marks**: 100 | **Weightage**: 50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **28** | **26** | **46** |  |  |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

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| **Answer ALL the Questions. Each question carries 2marks. 10 x 2 Marks=20 Marks** | | | | |
| **1** | List any four objectives of ground improvement techniques. | **2 Marks** | **L1** | **CO1** |
| **2** | Explain karst deposits which is one amongst the problematic soils. | **2 Marks** | **L1** | **CO1** |
| **3** | List the various methods of deep compaction of soil. | **2 Marks** | **L1** | **CO1** |
| **4** | Explain what ground modification technique is. | **2 Marks** | **L1** | **CO1** |
| **5** | List the various methods of drainage and dewatering. | **2 Marks** | **L1** | **CO2** |
| **6** | Explain vertical drains which enhances consolidation process of soil. | **2 Marks** | **L2** | **CO2** |
| **7** | List any two dis advantages of sand drains. | **2 Marks** | **L2** | **CO2** |
| **8** | Explain soil stabilization technique of ground modification. | **2 Marks** | **L1** | **CO3** |
| **9** | Explain the mechanism of reinforced earth. | **2 Marks** | **L1** | **CO3** |
| **10** | List any two applications of geogrids. | **2 Marks** | **L1** | **CO3** |

**Part B**

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| **Answer the Questions Total 80 Marks.** | | | | | |
| **11.** | **a.** | Problematic soil cause additional problems from the engineering point of view as a result of its composition or a change in environmental conditions. Explain the various problematic soils. | **10 Marks** | **L1** | **CO1** |
|  | **b.** | Selection of ground of ground improvement technique is challenging for geotechnical engineers. List the various factors affecting the selection of ground improvement techniques. | **10 Marks** | **L2** | **CO1** |
| **or** | | | | | |
| **12.** | **a.** | Sandy soil in a borrow pit has unit weight of solids as 28 kN/m3, water content equal to 11% and bulk unit weight equal to 16.4 kN/m3. How many cubic meter of compacted fill could be constructed of 3500 m3 of sand excavated from the borrow pit if the required value of porosity in the compacted fill is 30%, Also compute the change in degree of saturation. | **10 Marks** | **L3** | **CO1** |
|  | **b.** | An embankment, having total volume of 3000 cubic meter is to be constructed having a bulk density of 1.98 g/cm3 and a placement water content of 18%. The soil is to be obtained either from borrow area A or B with a voids ratio of 0.78 and 0.69 respectively and water content of 16% and 12% respectively. Taking G=2.66, for both the soils, determine the volume of soil required to be excavated from each of the areas. If the cost of excavation is Rs. 35 per cubic meter and the cost of transportation is Rs. 32 and 36 per cubic meter for the borrow areas A and B respectively, which of the borrow area is more economical? | **10 Marks** | **L2** | **CO1** |
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| **13.** | **a.** | Soil stabilization with additive-lime alters the properties of problematic soils. In this context explain Lime stabilization with mechanism. | **10 Marks** | **L3** | **CO2** |
|  | **b.** | Drainage and dewatering is one of the effective method of ground modification techniques. Explain Electro Osmosis method of drainage and dewatering with a neat sketch. | **10 Marks** | **L1** | **CO2** |
| **or** | | | | | |
| **14.** | **a.** | The cracks in the rocks and soils are sealed with grouts. Explain the various aspects of grouting with a neat sketch. | **10 Marks** | **L1** | **CO2** |
|  | **b.** | Heating or cooling of soil bring about marked changes in soil properties. Explain freezing method of soil stabilization with a neat sketch. | **10 Marks** | **L1** | **CO2** |

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| **15.** |  | Geo-synthetic materials have various applications with respect to construction activities. Explain the various types of Geo-synthetics in detail. | **20 Marks** | **L3** | **CO3** |
| **Or** | | | | | |
| **16.** | **a.** | Installation of stone columns gives reinforcement effect to the soil. Explain failure mechanism of stone columns with a neat sketch. | **10 Marks** | **L1** | **CO3** |
|  | **b.** | Ground anchors are provided in various geotechnical and civil engineering scenarios where there is a need for soil modification. Explain various components of ground anchors with a neat sketch and also state its applications. | **10 Marks** | **L1** | **CO3** |

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| **17.** | **a.** | Soil nailing technique is useful in cases of steep or unstable terrain. Explain soil nailing technique and its applications with a neat sketch. | **10 Marks** | **L1** | **CO3** |
|  | **b.** | Rock bolts are Intended to mobilize the inherent strength of a jointed and fragmented mass of rock by active or passive confinement.Explain the principles and functions of rock bolts. | **10 Marks** | **L3** | **CO3** |
| **Or** | | | | | |
| **18.** | **a.** | Micro-piles are small-diameter piles. List the various applications of micro-piles. | **10 Marks** | **L3** | **CO3** |
|  | **b.** | Geo-synthetics are polymeric materials. Explain the functions of geo-synthetics as a separator, filtrator and separator with neat sketches. | **10 Marks** | **L3** | **CO3** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***