

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech III Year I Semester Supplementary Examinations June-2024

GEOTECHNICAL ENGINEERING

(Civil Engineering)

Time: 3 Hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

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|---|---|--|-----|----|----|
| 1 | a | State Darcy's law. | CO1 | L2 | 2M |
| | b | Define relative compaction. | CO2 | L1 | 2M |
| | c | List out various assumptions of Boussinesq's equation. | CO3 | L1 | 2M |
| | d | Mention various uses of Taylor's stability number. | CO4 | L1 | 2M |
| | e | What are hand carved samplers? | CO5 | L1 | 2M |

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

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|---|---|---|-----|----|----|
| 2 | a | Using three phase diagram of soil, develop an expression for Void ratio, water content, specific gravity and degree of saturation. | CO1 | L1 | 5M |
| | b | The moist unit weight of soil sample is 19.2 kN/m^3 and has water content of 9.8%. The specific gravity of soil particles is 2.69. Determine dry unit weight, void ratio and porosity and degree of saturation. | CO1 | L2 | 5M |

OR

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|---|---|--|-----|----|----|
| 3 | a | What are consistency limits explain with graph. | CO1 | L1 | 5M |
| | b | Explain in detail the laboratory method of liquid limit. | CO1 | L2 | 5M |

UNIT-II

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|---|---|--|-----|----|----|
| 4 | a | The Maximum dry density of a sample by the light compaction test is 1.78 g/ml at an optimum water content of 15%. Find the air voids and degree of saturation $G=2.67$. What would be the corresponding value of dry density on the zero air voids at optimum moisture content. | CO2 | L3 | 5M |
| | b | An earth embankment is compacted at a water content 18%. to a bulk density of 19.2 kN/m^3 . If the specific gravity of the sand is 2.7 find the void ratio and the degree of saturation of compacted embankment. | CO2 | L3 | 5M |

OR

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|---|---|---|-----|----|-----|
| 5 | a | In a consolidation test the following results have been obtained. When the load was changed from 50 kN/m^2 to 100 kN/m^2 , the void ratio changed from 0.70 to 0.65. Determine compression index, coefficient of volume change and coefficient of consolidation in mm^2/sec . | CO2 | L3 | 10M |
|---|---|---|-----|----|-----|

UNIT-III

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|---|---|---|-----|----|----|
| 6 | a | A concentrated load of 2000 kN acts vertically at the ground surface. Determine the vertical stress at a point P which is 6m directly below the load. Also calculate the vertical stress at a point R which is at a depth of 6m but at a horizontal distance of 5m from the axis of the load. | CO3 | L3 | 5M |
| | b | Determine the vertical stress at a point P which is 3m below and at a radial distance of 3m from the vertical load 100kN. Use westergaard's solution. | CO3 | L3 | 5M |

OR

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|---|---|--|-----|----|----|
| 7 | a | Explain the concept of 'Westergaards theory' in soils. | CO3 | L2 | 6M |
| | b | What do you understand by 'Pressure bulb'? Illustrate with sketches. | CO3 | L1 | 4M |

UNIT-IV

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|---|---|--|-----|----|----|
| 8 | a | What are the factors causes the slope failures? | CO4 | L1 | 4M |
| | b | Explain different types of slope failures with neat sketches | CO4 | L2 | 6M |

OR

- 9 Give the step by step procedure of analyzing stability of a finite slope using Swedish circle method. CO4 L2 10M

UNIT-V

- 10 a What are the different stages in sub soil exploration? CO5 L1 5M
b Explain various uses of site investigations. CO5 L2 5M

OR

- 11 a How boring operations are carried out using rotary auger boring and percussion drilling? CO5 L2 5M
b Describe the construct of a split spoon sampler. Explain how undisturbed soil sample is extracted using it. CO5 L1 5M

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