

Reg. No:

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

**B.Tech III Year I Semester Regular Examinations Feb-2021**

**SOIL MECHANICS**

(Agricultural Engineering)

Time: 3 hours

Max. Marks: 60

**PART-A**

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

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|---|---|---|----|
| 1 | a | Define Toughness index.                                     | 2M |
|   | b | What is meant by effective stress and write expression?     | 2M |
|   | c | Write the formula for Boussinesq's equation for point load. | 2M |
|   | d | Coefficient of volume change.                               | 2M |
|   | e | Write the formula for major and minor principle stress.     | 2M |

**PART-B**

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

**UNIT-I**

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|---|---|---|----|
| 2 | a | Using three phase diagrams of soil, derive an expression for water content in terms of Void ratio, Specific gravity and degree of saturation.                                       | 6M |
|   | b | A saturated soil sample has a water content of 25% and unit weight of 20 kN/m <sup>3</sup> . Determine the Specific gravity of the solid particles, dry unit weight and void ratio. | 4M |

OR

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|---|--|---|-----|
| 3 |  | Using three phase diagrams of soil, derive an expression for saturated unit weight of soil in terms of void ratio, unit weight of water, specific gravity and degree of saturation. | 10M |
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**UNIT-II**

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| 4 |  | What are the different methods for determination of coefficient of permeability in a laboratory? Explain any one method. | 10M |
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| 5 |  | Explain the constant head permeability test with the help of neat sketch. | 10M |
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**UNIT-III**

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| 6 |  | Explain Westergaard's theory for the determination of the vertical stress at a point. | 10M |
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OR

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| 7 |  | A rectangular foundation 4m by 5m carries a u.d.l of 200kN/m <sup>2</sup> . Determine the vertical stress at a point p located and at a depth of 2.5m | 10M |
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**UNIT-IV**

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| 8 |  | Describe the consolidometer test. Show how the results of this test are used to predict the rate of settlement and the magnitude of settlement. | 10M |
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OR

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| 9 |  | Calculate the final settlement of the clay layer with an increase of pressure of 30kN/m <sup>2</sup> at mid height of layer take $\gamma = 10\text{kN/m}^3$ . | 10M |
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**UNIT-V**

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| 10 |  | What is unconfined compression test? Sketch the apparatus used what are its advantages over triaxial test. | 10M |
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OR

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| 11 |  | The stresses at failure on the failure plane in a cohesion less soil mass was Shear stress = 5 kN/m <sup>2</sup> ; Normal stress = 18 kN/m <sup>2</sup> . Determine the resultant stress on the failure plane, the angle of internal friction of the soil and the angle of inclination of the failure plane to the major principal plane. | 10M |
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