

Code No: RT22353

R13**SET - 1****II B. Tech II Semester Supplementary Examinations, November-2018****SOIL MECHANICS**

(Agricultural Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answer **ALL** the question in **Part-A**3. Answer any **THREE** Questions from **Part-B**
~~~~~**PART -A**

1. a) Write a brief note on Textural classification.
- b) Explain briefly the concept of Westerguard's analysis.
- c) Explain the principle of the direct shear test. What are the advantages of this test? What are its limitations?
- d) Bring out the usefulness of compaction test in the Laboratory in soil engineering practice
- e) Define the terms 'Compression index', coefficient of consolidation', and 'coefficient of compressibility', and indicate their units and symbols.
- f) Write notes on Rankine earth pressure theory.

**PART -B**

2. a) Sketch typical complete grain-size distribution curves for (i) well graded soil and (ii) uniform silty sand. From the curves, determine the uniformity coefficient and effective size in each case. What qualitative inferences can you draw regarding the engineering properties of each soil?
- b) A certain soil has 99% by weight finer than 1 mm, 80% finer than 0.1 mm, 25% finer than 0.01mm, 8% finer than 0.001 mm. Sketch the grain-size distribution curve and determine the percentage of sand, silt and clay fractions as per IS nomenclature. Determine Hazen's effective size and uniformity coefficient.
3. a) What are the basic assumptions in Boussinesq's theory of stress distribution in soils? Show the vertical stress distribution on a horizontal plane at a given depth and also the vertical stress distribution with depth. What is a 'Pressure Bulb'?
- b) Find the vertical pressure at point 4 metres directly below 20kN point load acting at a horizontal ground surface. Use Boussinesq's equations.
4. a) Differentiate between unconsolidated undrained test and a drained test. Under what conditions are these test results used for design purposes?
- b) A cylindrical specimen of a saturated soil fails at an axial stress of  $180 \text{ kN/m}^2$  in an unconfined compression test. The failure plane makes an angle of  $54^\circ$  with the horizontal. What are the cohesion and angle of internal friction of the soil?

Code No: RT22353

**R13****SET - 1**

5. a) What are the various factors that affect the compaction of soil in the field? How will you measure compaction in the field? Describe a method with its limitations.
- b) The soil from a borrow pit is at a bulk density of  $17.10 \text{ kN/m}^3$  and a water content of 12.6%. It is desired to construct an embankment with a compacted unit weight of  $19.62 \text{ kN/m}^3$  at a water content of 18%. Determine the quantity of soil to be excavated from the borrow pit and the amount of water to be added for every  $100 \text{ m}^3$  of compacted soil in the embankment.
6. a) Describe a suitable method of determining the compression index of a soil.
- b) The void ratio of clay is 1.56, and its compression index is found to be 0.8 at the pressure  $180 \text{ kN/m}^2$ . What will be the void ratio if the pressure is increased to  $240 \text{ kN/m}^2$ ?
7. a) Explain briefly about infinite and finite slopes.
- b) Write the expressions for the factor of safety using the method of slices when the slope of a homogeneous earth dam is dry and when fully submerged. Assume the soil to possess both cohesion and friction.