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B.E / B.Tech (Full Time) END SEMESTER EXAMINATIONS- APR/MAY 2019

Agricultural & Irrigation Engineering Branch

3 Semester

AI 8301 & Soil Science & Engineering

(Regulation 2012)



Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Write the advantages of soil organic matter.
2. What is soil water and also role of adhesion and cohesion in soil?
3. What is land use capability classification?
4. Interpret the following expression based on the Soil Taxonomical Classification: "*Miami fine loamy mixed mesic typic hapludalf*".
5. Compare between liquid limit and plastic limit of soil.
6. A granular soil is compacted to moist unit weight of 20.45 KN/m<sup>3</sup> at moisture content of 18%. What is relative density of the compacted soil? If  $e_{max}=0.85$ ,  $e_{min}=0.42$  and  $G_s=2.65$ ?
7. Define shear strength of soil.
8. What is the height of capillary rise in a soil with an effective size of 0.06 mm and void ratio of 0.72?
9. What are the different types of slope failure?
10. Differentiate between shallow and deep foundations.

Part – B ( 5 x 16 = 80 marks)  
(Question No.11 is Compulsory)

11. Define soil structure. How are they classified and explain with neat sketch? Discuss the genesis of soil structure.
12. a) Explain the soil orders of Tamil Nadu. Explain the reasons or salinity of soil and how it is injury to plants. What are the crops are suitable for cultivation in the saline soil?  
(OR)  
b) How land capability classes are is classified? Explain the characteristic of different types of land capability classification.
13. a) i. Explain how the liquid limit of soil is determined in the laboratory with neat sketch  
li An undisturbed sample of soil has a volume of 100 cm<sup>3</sup> and mass of 190 gram. On oven drying for 24 hours, the mass is reduced to 160 gram. If the specific gravity is 2.68. Calculate (a) water content (b) void ratio (c) degree of saturation of the soil.

(OR)

- b) i. State the factors affecting compaction. How density can be controlled in the field?
- ii. The in-situ percentage voids a sand deposit is 34 percent for determining the density index, dried sand from the stratum was first filled loosely in a 1000 cm<sup>3</sup> mould and was then vibrated to give a maximum density. The loose dry mass in the mould was 1610 gram and dense dry mass at maximum compaction was found to be 1980 gram. Calculate the density index if the specific gravity of the sand particle 2.67.

14. a) Explain with neat sketches the procedure of conducting direct shear test. Give its advantages over other methods of finding shear strength of soil.

(OR)

- b) i. Explain the details of Vane shear test apparatus. How is the shear strength determined by it? Derive the expression for determining shear test.
- ii. A clay deposit is having a series of silt separations at an average vertical spacing of 2 meters. The thickness of silt layer is 4.5 millimeters. Calculate the ratio of horizontal and vertical permeability of clay if permeability of silt is 75 times that of clay.

15. a) i. Describe about the Terzaghi's analysis on bearing capacity of soils with neat sketch. Explain the term general shear failure and punching shear failure.

(OR)

- b) i. Explain the concept of friction circle method of analysis for the design of slopes of earthen embankment.
- ii. A footing 3 m X 3 m is existing over a sandy soil. The maximum settlement allowed is 1.5 cm. Two load tests are made at the site, one with a 1 m X 1 m test plate and the other with a 2.0 m X 2.0 m plate. For 1.5 cm settlements, the corresponding loads for the two tests were found to be 10 tonnes and 30 tonnes respectively. Calculate the bearing capacity of the soil. What load the 5 m X 5 m footing shall be able to carry on the same load?

