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B.E / B.Tech. (Full Time) DEGREE ARREAR EXAMINATIONS, NOV / DEC 2013

AGRICULTURAL AND ENGINEERING BRANCH

IV SEMESTER – (REGULATIONS 2008)

AI 9251 – SOIL SCIENCE AND ENGINEERING

9

Time : 3 hours.

Max Marks: 100

Answer ALL Questions

Part – A (10 x 2 = 20 Marks)

1. Differentiate between soil and sub soil.
2. What are different forms of soil water?
3. Differentiate between well graded and poor graded soil.
4. Define the term compaction of soil.
5. Define Darcy's law?
6. Define earth pressure theory?
7. Differentiate between shallow and deep foundation
8. What is slope stability?
9. Give the procedure for preparation of land use maps.
10. What are the important soil forming minerals?

Part – B (5 x 16 = 80 Marks)

11. i).What is soil structure? Explain with a neat sketch the 4 types. (8)  
ii) Explain briefly the influence of soil reaction on NPK nutrients availability to plants? (8)

12. a i) Explain how the plastic limit of soil is determined in the laboratory with neat sketch. (10)  
ii) An oven-dry soil sample of volume 225 cm<sup>3</sup> weighs 390 gram. If the grain specific gravity is 2.72, determine the void-ratio and shrinkage limit. What will be the water content which will fully saturated the sample and also cause an increase in volume equal to 8% of the original dry volume. (6)

OR

- b 1) Describe briefly three types of field compaction 4 types of rollers and explain the HRB Indian standard soil classification? How will you determine by core cutter method? (16)
13. a. i) What is Permeability? Describe the laboratory measurement of permeability of soil sample using the Darcy's principle on fine grained soil? (10)  
ii) A pumping test was made on a pervious soil extending a depth of 20m, when a bed of clay was encountered. The normal ground water level was 1m below the ground level. Observation wells were located at a distance of 4m and 8m from the pumping well at a discharge 9 m<sup>3</sup>/min from a pumping well. The draw-down at 4m was 2m and at 8m was 0.5m. Calculate K in cm/sec. (6)

OR

- b. i) Describe briefly the test that you would perform on this instrument in order to determine the compressibility of a soil. (10)
- ii) In laboratory consolidation test, a sample of clay with a thickness of 2.6 cm reached 5-% consolidation in 8 minutes. The sample was drained up and bottom. The clay layer from which the sample was taken is 8 m thick. It is covered by layer of sand through which water can escape and is underlain by a practically impervious bed of intact shale. How long will the clay require to reach 50% consolidation? (6)

14. a. i) Write the Terzaghi's assumptions, analysis, expressions, and limitation for ultimate bearing capacity of soil. (12)
- ii) Explain the factors affecting the bearing capacity of soil. (4)

OR

- b. i) Explain the Swedish circle method of analysis of stability of slopes of embankment, and the assumptions made. (10)
- ii) Differentiate between slope failure and base failure. What does each of the above type occur? (4)
- ii) What is the  $\phi$ -circle method for analyzing slopes stability? (2)

15. a. i) Define soils? How are they formed in nature? Describe briefly the various types of soils found in India. (16)

OR

- b. i) Explain on what considerations the choice of the detail of survey be made using an example. (3)
- ii) Describe in detail the definition and classes of soil and land irrigability, and list the soil factors used for determining soil irrigability as well as how the soil irrigability score is evolved using them. (13)

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