
B.E / B.Tech. (Full Time) DEGREE ARREAR EXAMINATION, OCT / NOV 2011

AGRICULTURAL AND IRRIGATION ENGINEERING BRANCH

IV SEMESTER – (REGULATIONS 2008)

AI 9251 – SOIL SCIENCE AND ENGINEERING

Time : 3 hours. Max Marks: 100

Answer ALL Questions

Part – A (10 x 2 = 20 Marks)

1. What are the types of soil structures?
2. Distinguish between Ammonification and Nitrification.
3. Define the term dry density and porosity of soil.
4. The mass of a moist sample of soil is 30 gm when measured on a tin lid of mass 16 gm. After drying in an oven for 24 hours at 105°C, the mass of the tin and sample is 23 gm. calculate the moisture content of the soil.
5. Define earth pressure theory?
6. Define Darcy's law?
7. What is the minimum depth required for a foundation to transmit a pressure of 74 KN/m^2 in a sandy soil with a specific weight of soil as 18 KN/m^3 and frictional angle is 19°. What will be the bearing capacity if a depth of 1.65 m is adapted to Rankine's formula?
8. Differentiate between shallow and deep foundation.
9. Give the procedure for preparation of land use maps.
10. What are the important soil forming minerals? How are soils formed?

Part – B (5 x 16 = 80 Marks)

11. i) Describe briefly the soil orders of USDA Soil Taxonomical Classification, and describe the four most important among the orders found in India. (13)
iii) Calculate the total porosity of a soil when the particle density is 2.88 g/cm^3 and the bulk density of soil is 1.52 g/cm^3. (2)

or

12. a i) Describe briefly three types of field compaction and instruments and explain the HRB, USC and Indian standard soil classification?

b 1)Describe briefly on Atterberg limits of consistency of soils with a neat sketch? 10
ii)A series of te4sts on a soil sample of silty clay indicated the following index. Calculate the co-effiecient of uniformity, plasticity index and liquidity index. D60=0.0050mm, D10=0.0007mm, LL=53.9%, PL=23.4% and W=51.2%. (5)

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 falling head permeameter test, head causing flow was initially 50 cm and drops 2 cm in 5 minutes. How much time is required for the head to fall 25cm? (5)

or

b i) Explain how the direct shear test is carried out in the laboratory with neat sketch. (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^3/min from a pumping well. The draw down at 4m was 2m and at 8m was 0.5m. Calculate K in cm/sec. (5)

14. a i) What is foundation? Explain with neat sketches the different types of deep foundations. (10)
Ii What are the factors affecting bearing capacity of soil (5)

or

b i) Write the Terzaghi's assumptions, analysis, expressions, and limitation for ultimate bearing capacity of soil. (10)
(ii) A square footing of size 2.5m x 2.5m is built in a homogenous bed of sand of unit weight of 20 KN/m3 and having an angle of shearing resistance 36°, the depth of base of footing is 1.5m below the ground surface. Calculate the safe load that can be carried by a footing with a factor of safety as 3 against the complete shear failure. Use Terzaghis formula. (5)

15. a i) Describe briefly the various types of soils found in Tamil Nadu. (15)

or

b. i) What is soil survey? Explain briefly the types and methods of soil survey? (8)
c. ii) What are the problem soils? How the land is reclamation to cultivated land? (8)