B. Tech. 5th Semester (Civil) F. Scheme Examination,

December–2017

SOIL MECHANICS

Paper–CE-307-F

Time allowed : 3 hours]   [Maximum marks : 100

Note : (i) *Question no. 1 is compulsory.*

    (ii) *Attempt five questions in all selecting one question from each unit.*

    (iii) *All questions carry equal marks.*

    (iv) *Assume missing data, if any, suitably.*

1. Describe the following briefly :   20

   (a) Origin of soil

   (b) Relative density of soil

   (c) Purpose of soil classification

   (d) Discharge velocity and seepage velocity

   (e) Protective filter

   (f) Field control of compaction

   (g) Newmark's chart

   (h) Construction period settlement

   (i) Sensitivity

   (j) Earth pressure at rest.

Section–D

8. (a) What is shear strength ? What are the different tests to determine shear strength of soil ? Explain under what conditions these tests are used.   10

   (b) What is Mohr stress circle ? Explain Mohr-Coulomb failure-criterion with diagram.   10

9. (a) Explain active, passive and at rest conditions in earth pressure against a retaining wall.   10

   (b) Explain Coulomb's earth pressure theory to determine active earth pressure with diagram.   10

Unit-I

2. (a) A natural soil f deposit has a bulk unit weight of 18.44 kN/m³ and water content of 5%. Calculate the amount of water required to be added to 1 cubic metre of soil to raise the water content to 15%. Also, determine the degree of saturation if the void ratio remain constant. Assume G=2.67.　　10

   (b) What is the purpose of soil classification ? Explain Indian Standard classification on the basis of plasticity.　　10

3. (a) What do you mean by sieve analysis and sedimentation analysis ? Describe the paricle size distribution curve in detail.　　10

   (b) Define permeability of soil. Explain the laboratory and field methods to determine coefficient of permeability.　　10

Section-B

4. (a) A sand deposit consists of 2 layers. The top layer is 2 m thick (ρ = 1705 kg/m³) and bottom layer is 3.5 m thick (ρ_sat = 2065 kg/m³). The water table is at a depth of 3.5 m from the surface and the zone of capillary saturation is 0.5 m above water table.

   Draw the diagram showing variation of stresses and determine effective stress at each section.　　10

   (b) What is the principal of effective stress ? Determine effective stress under hydrostatic condition.　　10

5. (a) Describe the role of moisture and compactive effect in compaction. Explain the laboratory determination of optimum moisture content.　　10

   (b) What do you mean by compaction ? Explain the factors affecting compaction.　　10

Section-C

6. (a) Desfine vertical stress. Explain different vertical stress distribution diagrams, in detail.　　10

   (b) Write a short note on Westerguard's analysis. Differentiate between Boussinesq's equation and Westerguard's analysis.　　10

7. (a) Explain in detail Casagrande's graphical method for estimating coefficient of cosolidation.　　10

   (b) Describe the following terms :

      (i) Normally and over consolidated clay.

      (ii) Coefficient of volume change

      (iii) Primary and secondary consolidation.　　10