Total No. of Questions—**12**] [Total No. of Printed Pages—**4**

Seat No.	

[4957]-105

S.E. (Civil) (First Semester) EXAMINATION, 2016
GEOTECHNICAL ENGINEERING
(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer three questions from Section I and *three* questions from Section II.

(*ii*) Answer to the two Sections should be writen in separate books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Use of logarithmic tables, slide rule, electronic calculator is allowed.

(*v*) Assume suitable data, if necessary.

SECTION I

1. (*a*) Explain with sketch Casagrande Plasticity Chart. [6]

(*b*) What is Stoke's law ? Describe the procedure for doing hydrometer analysis for grain size analysis ? [6]

(*c*) Define with expression void ratio, porosity, degree of saturation, water content. [6]

Or

2. (*a*) Draw the standards shape of the particle size distribution curves for well graded soil, uniform soil and gap graded soil. [6]

(*b*) Define the following terms :

(*i*) flow index

P.T.O.

(*ii*) Toughness index

(*iii*) Liquidity index

(*iv*) Plasticity index. [6]

(*c*) Write the various types of soil deposits in India with their significant soil property and explain the desert soil deposit in detail. [6]

3. (*a*) State and explain the factors affecting permeability of soils. [6]

(*b*) State and explain Darcy's law. [4]

(*c*) In a falling head permeability test on a silty-clay sample, the following results were obtained :

sample length 120 mm, sample diameter 80 mm, initial head = 1150 mm, final head = 420 mm, time for fall in head = 8 minutes, stand pipe diameter being 10 mm. Find the coefficient of permeability of the soils in mm/sec. [6]

Or

4. (*a*) For a layered soil deposit derive the relation for permeability when flow occurring parallel to stratification. [6]

(*b*) Calculate the coefficient of permeability of a soil sample, 10 mm in height and 65 cm^2 in cross-section area, if a quantity of water equal to 460 ml passed down in 10 minutes, under an effective head of 50 cm. [6]

(*c*) Write short note on quicksand phenomena. [4]

5. (*a*) What is compaction ? How it is differ from consolidation ? Also explain effect of compaction on soil properties. [8]

(*b*) State Boussinesq's equation for point load and explain the terms in it. [8]

Or

6. (*a*) Write a short note on Newmark's chart. [8]

(*b*) Draw a typical curve showing the relation between MDD-OMC and explain the terms MDD, OMC and Air. voids line. [8]

SECTION II

7. (*a*) What is Coulombs equation for shear strength of soil ? Discuss the factors which affect the shear strength parameters of soil. [6]

(*b*) What are the advantages and disadvantages of triaxial compression test in comparison with the direct shear test ? [6]

(*c*) In a consolidated drained triaxial test, a specimen of a clay fails at a cell pressure of 60 kN/m^2. The effective shear strength parameters are c = 15 KN/m^2 and φ = 20°. Determine the additional stress required for the failure. [6]

Or

8. (*a*) Draw a typical Mohr circle for unconfined compression test and explain how you would determine the shear strength parameters from the Mohr circle. [6]

(*b*) What is liquefaction of sands ? How it can be prevented. [6]

(*c*) Two samples of a soil were tested in a triaxial machine. The all round pressure maintained for the first sample was 200 kN/m^2. and a failure occurred at an additional axial stress of 770 kN/m^2. For second sample, these values were 500 kN/m^2 and 1370 kN/m^2, respectively. Find *c* and φ for the soil. [6]

9. (*a*) What is infinite and finite slopes ? Give examples. [5]

(*b*) Define the terms active earth pressure and passive earth pressure. [5]

(*c*) A wall with a smooth vertical back, 10 m high, supports a purely cohesive soil with c = 9.81 kN/m^2, and γ = 17.66 kN/m^3. Determine :

(*i*) total Rankin's active pressure against the wall

(*ii*) position of zero pressure [6]

Or

10. (*a*) What is earth pressure at rest ? Derive an equation for determining the magnitude of earth pressure for at rest condition. [5]

(*b*) What is stability number ? What is its utility in the analysis of stability of slopes ? [5]

(*c*) What are the different modes of slope failure ? Give examples. [6]

11. (*a*) What are different modes of failure of rocks ? [6]

(*b*) Explain durability of rocks. [4]

(*c*) Write a short note on : [6]

(*i*) Porosity of rocks

(*ii*) Permeability of rocks. [6]

Or

12. (*a*) What are different index properties of rocks ? [6]

(*b*) Write a short note on :

(*i*) Geological classification of rocks

(*ii*) Shear strength of rocks. [10]