

B.E. Civil Engineering (CBCS Pattern) Third Semester (Old+CBCS)
3BECE005 / CI304 : Geotechnical Engineering-I

P. Pages : 2

Time : Three Hours



GUG/W/18/11480

Max. Marks : 80

- Notes :
1. All questions carry equal marks and compulsory.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.
 5. Use of non programmable calculator is allowed.

1. a) Prove from the basic principle that. 8

$$r_{\text{sub}} = \left(\frac{G-1}{1+e} \right) r_w$$

- b) Discuss the formation of soil by giving the examples of each type of soil. 8

OR

2. a) Define the term “Density Index” of soil? 4

- b) With a neat sketch, explain “Core cutter method.” for determining the field density of soil. 9

- c) Establish the relation between void ratio and porosity of soil. 3

3. a) Define Liquid limit of soil. Describe a method to determine liquid limit of soil. 8

- b) Enumerate the various methods of determining specific gravity of soil. Explain any one method in detail. 8

OR

4. a) What does the following symbols stands for. 3
SP, GW, GM, CL, CH, OH.

- b) A saturated soil sample has a volume of 30 cm³ at the liquid limit. If the soil has liquid limit and shrinkage limit of 45% and 22% respectively. Determine the minimum volume which can be attained by the soil specimen Take $G = 2.72$. 8

- c) Write a note on “Textural classification” of soil. 5

5. a) Discuss the application of “Flownet.” 8

- b) Discuss the factors affecting “Permeability” of soil. 8

OR

6. a) Due to rise of temperature the viscosity and unit weight of the percolating fluid are reduced to 65% and 90% respectively. Other things being constant calculate the percentage change in coefficient of permeability. 8

- b) With a neat sketch explain “Constant head test” for determination of permeability in laboratory. 8

7. a) Compare standard proctor test with modified proctor test. 6

b) In a standard compaction test, Following observation were made. 10

Water content (%)	5.06	9.2	11.5	13.5	15.8
Weight of compacted soil in the mould (N)	16.10	18.4	20.6	20.4	19.10

Calculate optimum moisture content and maximum dry density by drawing compaction curve.

Take volume of mould = 1000 cm^3

OR

8. a) Explain “Virgin compression curve.” 6

b) What are the assumptions made in Terzaghi's theory of one dimensional consolidation. 6

c) Define the term “Consolidation settlement.” How it is determined. 4

9. a) Explain Mohr's theory for failure of soil mass? What are its limitation. 8

b) Following observations are recorded for normal load and maximum shear force for the specimen of sandy clay tested in shear box 36 cm^2 in area under undrained conditions. Plot the failure envelope and determine the values of apparent cohesion and angle of shearing resistant. 8

data

Normal load (N)	100	210	300	400
Maximum shear force (N)	110	155	195	240

OR

10. a) Explain Boussinesq's theory of “Stress distribution” for soil by stating the assumption made therein. 8

b) Write a note on “Newmark's chart.” 8
