Total No. of printed pages = 4

CT-503/Geotech Engg./5th Sem/2017/M

GEOTECHNICAL ENGINEERING

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. (a) Draw the 2-phase and 3-phase diagrams of a soil mass. 3

   (b) Differentiate between void ratio and porosity of soil. 2

   (c) Name the forces which are predominant in cohesive and cohesionless soil. 2

   (d) Define degree of saturation of a soil mass. 2

   (e) Between sand and gravel which is more permeable ? 1

[Turn over

2. (a) The ratio of saturated unit weight to dry unit weight of a soil is 1.25. If the specific gravity of solids is 2.56, find the void ratio of the soil. 5

(b) 1 cumec of wet soil weighs 20 KN. Its dry weight is 18 KN. Specific gravity of solids is 2.67. Determine the water content, porosity, void ratio and the degree of saturation. Draw a phase diagram. 10

3. The following properties were determined for two soils A and B :

Soil →	A	B
Water content	37%	25%
Liquid limit	61%	35%
Plastic limit	25%	20%
Specific gravity	2.72	2.68
Degree of saturation	100%	100%

Which of these soil

(i) contains more clay particles

(ii) has a greater saturation unit weight

(iii) has a greater dry unit weight

(iv) has a greater void ratio ?

Your answer should be supported by computation.

3+4+4+4=15

4. For the subsoil conditions shown in Figure 1, draw the total effective stress and pore water extra pressure diagrams upto a depth of 8m. Neglect capillary flow. 15

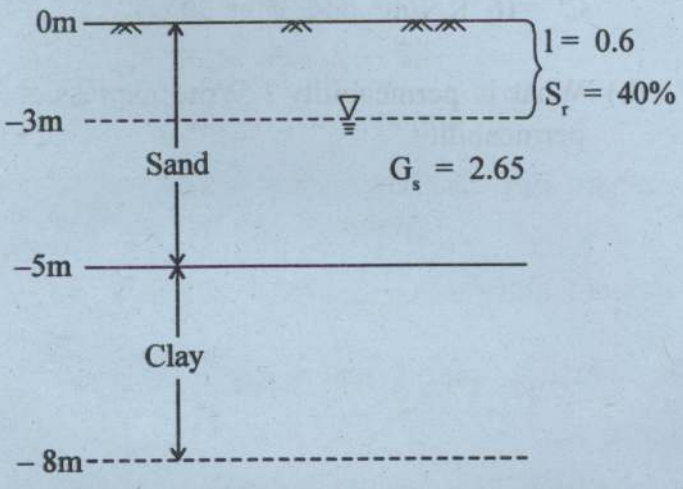

Fig. 1

5. (a) What are the various factors affecting the permeability and compaction of a soil mass ? Discuss separately. 10

(b) What is consistency of soil ? Write about the different consistency limits of a fine grained soil. 5

6. (a) Determine the shear-strength in terms of effective stress on a plane within a saturated soil mass at a point where the total normal stress is 200 KN/m^2 and the pore water pressure is 80 KN/m^2. The effective stress shear strength parameters for the soil are : C' =16 KN/m^2 and $\varphi' = 30°$. 10

(b) What is permeability ? Write expression for permeability. 2+3=5