QPC: RJ19BTECH123 AR 19 Reg. No

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fourth Semester – Regular) Examinations, June – 2021

BPCCE 4010 - Geo Technical Engineering-1

(Civil Engineering)

Time: 2 hrs Maximum: 50 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) **(1 x 10 = 10 Marks)**

Q.1. Answer ***ALL*** questions

a. Void ratio is an important parameter which governs
   (i)permeability (ii) settlement
   (iii)stability problems of soil (iv) All of the above

b. Porosity and void ratio are related by:
   (i) $e = n/(1-n)$ (ii) $e = n/(1-n)$
   (iii)1-e = n (iv) $(1+n)/n = e-1$

c. Stokes law does not hold good if the size of particles is
   (i) Greater than 0.2 mm (ii) less than 0.2 micro m
   (iii)Neither a or b (iv) both a and b

d. The particle size distribution curve with a hump is obtained for a
   (i) Uniform soil (ii) Well-graded soil
   (iii) Gap-graded soil (iv)Poorly-graded soil

e. The shrinkage index is equal to
   (i) Liquid limit – plastic limit (ii) Liquid limit – shrinkage limit
   (iii) Plastic limit – shrinkage limit (iv) None of the above

f. IS classification of soil is in many respects similar to
   (i)AASHTO classification (ii) Textural classification
   (iii)Unified soil classification (iv) MIT classification

g. When consolidation of a saturated soil sample occurs, the degree of saturation
   (i) Increases (ii) Decreases
   (iii) Remains constant (iv) may increase or decrease

h. The permeability of soil varies
   (i) inversely as square of grain size (ii) as square of grain size
   (iii) as grain size (iv) inversely as void ratio

i. The effective stress controls the following properties of soils:
   (i) Shear strength (ii) Compressibility
   (iii) Permeability (iv)All of the above

j. The shear strength of plastic undrained clay depends upon
   (i) Internal friction (ii) Cohesion
   (iii) Both a and b (iv) None of the above

PART – B: (Short Answer Questions) **(2 x 5 = 10 Marks)**

Q.2. Answer ***ALL*** questions

a. State Stokes law in the sedimentation method of analysis?

b. What is Darcy's law and explain any two limitations?

c. What is compaction and aim of the compaction?

d. Define consolidation?

e. What is Mohr's circle? Write any one characteristic of Mohr's circle?

PART – C: (Long Answer Questions) **(6 x 5 = 30 Marks)**

Answer ***ANY FIVE*** questions Marks

3. In a specific gravity test, the following observation were made: Weight of dry soil: 1.04 N. Weight of bottle + soil + water: 5.38 N. Weight of bottle + water: 4.756 N. What is the specific gravity of soil solids? If, while obtaining the weight 5.38 N, 3 ml of air remained entrapped in the suspension, will the computed value of G be higher or lower than the correct value? Determine also the percentage error. 6

4. Atterberg limit tests were carried out on a soil sample with the following results: 6

   Liquid limit = 40% , Plastic limit = 25%

   Classify the soil according to Unified Classification system and Indian Standard classification system.

5. Determine the average coefficient of permeability in the horizontal and vertical direction for a deposit consisting of three layers of thickness 5m,1m,2.5m and having the coefficient of permeability of 3810^-2 mm/sec, 3* 10^-5 mm/sec and 4* 10^-2 mm/sec respectively. Assume the layers are isotropic. 6

6. Determine the seepage discharge through the foundation of an earth dam if the flow net has 10 equipotential drops and 3.5 flow channels. The length of dam is 300m and the coefficient of permeability of the soil is 2.5* 10^-4 cm/sec. The level of water above the base of the dam is 12m on upstream and 4m on downstream. 6

7. A sample of soil was prepared by mixing a quantity of dry soil with 10% by mass of water. Find the mass of this wet mixture to produce a cylindrical, compared specimen of 15cm diameter and 12.5cm deep and having 6% air content. Find also the void ratio and dry density of the specimen if G=2.68 6

8. State the factors affecting the field compaction of soil? 6

9. The stresses on a failure plane in a drained test on a cohesionless soil are as under: 6

   Normal stress = 100 KN/m^2 ; Shear stress = 40KN/m^2

   (i) Determine the angle of shearing resistance and the angle which the failure plane makes with the major principle plane.

   (ii) Find the major and minor principal stresses.

10. Write about the merits and demerits of triaxial test? 6

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