Sub Code:RCE307

Paper Id: 100317 Roll No:

B TECH
(SEM-III) THEORY EXAMINATION, 2019-20
SOIL MECHANICS

Time: 3 Hours ***Total Marks: 70***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a. What is a block diagram? What is its use?
b. Define saturated density and bulk density.
c. What is coefficient of consolidation?
d. What do you understand by contact pressure?
e. Write the effect of surcharge and the capillary action on the effective stress.
f. Differentiate between consolidation and compaction.
g. Define zero air void line.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a. A soil sample has a porosity of 40 percent. The specific gravity of solids is 2.70. Calculate void ratio, dry density,unit weight if the soil is 50 % saturated and unit weight if the soil is completely saturated
b. Discuss the Mohr- coulomb theory.
c. What is field consolidation curve? How is it obtained?
d. The maximum dry density of a sample by the light compaction test is 1.78g/ml at an optimum water content of 15%. Find the air voids and the degree of saturation. G=2.67
What would be the corresponding value of dry density on the zero air void line at optimum water content?
e. Write short notes on the following :
   i. Bearing capacity.
   ii. Taylor's stability number.
   iii. Stability analysis.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) What are the main index properties of a fine grained soil? How are these determined in a laboratory?
(b) What is difference between the classification based on particle size and the textural classification? Discuss the limitations of the two systems.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) Write short notes on the following :
   i. New mark influence chart.
   ii. Effective stress principles.
(b) A sand deposit is 10 m thick and overlies a bed of soft clay. The ground water table is 3 m below the ground surface. If the sand above the ground water table has a degree of saturation of 45%, plot the diagram showing the variationof the total stress, pore water pressure and the effective stress. The void ratio of the sand is 0.70. Take G = 2.65.

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5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Discuss Taylor's methods of consolidation.

(b) Explain Terzaghi's theory of consolidation giving the assumptions made. A compressible clay layer with double drainage under certain load settles by 80 mm in5 years. What will be the settlement in 9 year, if the final settlement is expected to be 250 mm?

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Describe Standard Proctor test and the modified Proctor test. How would you decide the type of the test to be conducted in the laboratory?

(b) What are different methods of compaction adopted in the field? How would you select the type of roller to be used?

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) A direct shear test is run on medium sand under the normal stress of 50 KPa. The maximum shear stress at failure is measured as 30 KPa. Draw the Mohr's Circle at failure, and determine the magnitude of the principle stresses in the failure gone. What is the orientation to the plane of maximum shear stress at failure?

(b) Discuss the process of determining active earth pressure of cohesive soil.