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Printed Pages:02
Paper Id: 100501

Sub Code:RCE501
Roll No.

B.TECH.
(SEM V) THEORY EXAMINATION 2018-19
GEOTECHNICAL ENGINEERING

Time: 3 Hours *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data, then choose suitably.

SECTION A

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

a. Define origin of soil.
b. Draw the figure of element separated soil into three phases.
c. Compute the range for capillary rise in silt deposits.Assume value of void ratio as 0.7.
d. Define Analogy method by Laplace equation.
e. What are the preconsolidated stress?
f. Define undrained shearing strength.
g. What are the Limitations of Coulomb's theory?

SECTION B

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

a. What is the use of particle size distribution curve ? with the help of particle size distribution curve.
b. The specific gravity of soil solids for a given soil sample was determined by density bottle method using kerosene . Following observations were recorded. Compute the specific gravity of soil solids at test temperature which was maintained at 27°. Also report the value at 4° C.Take specific gravity of kerosene at 27° C as 0.733.
c. Define the terms (i) Quick sand conditon (ii) Exit gradient (ii) UU Test
d. In the laboratory a 2 cm thick soil sample takes 25 minutes to reach 30% degree of consolidation . Find the time taken for a 5 m thick clay layer in field to reach 40% consolidation . Assume double drainage both cases.
e. Using the Rankines theory, the total active thrust on a vertical wall 10 m high , if the soil retained has the following properties $\Phi=35^0$ $\gamma=19kN/m^3$

SECTION C

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

(a) The plastic limit of a soil is 24% and its plasticity index is 8 % . When the soil is dried from its state of plastic limit , the volume change is 26% of its volume of plastic limit . The corresponding volume change from liquid limit to dry state is 35% of its volume of liquid limit . determine the shrinkage limit and the shrinkage ratio.
(b) Define clay minerals. Also discuss Montmorillonite with neat sketches.

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

(a) Explain capillary siphoning with neat sketch.And alkso discuss about partially saturated soil.
(b) What are the assumptions and Limitations of Dupuits 's theory.

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

(a) Find out the expression for the law of deflection of flow line at the interface of two dissimilar soils.

(b) Write the difference between compaction and consolidation. The in situ void ratio of a granular soil deposits is 0.50 . The maximum and minimum soil ratio of the soil were determined to be 0.75 and 0.35. Gs=2.67 also determine the relative density and relative compaction of the deposit.

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

(a) In a consolidation test , the void ratio of the specimen which was 1.068 under the effective pressure of 214 kN/m^2 , changed to 0.994 when the pressure was increased to 429 kN/m^2 . calculate the coefficient of permeability , compression index . Also find the settlement of foundation resting on above type of clay, if thickness of layer is 8 m and the increase in pressure is 10 kN/m^2.

(b) A rectangular area 2mx4m carries a uniform load of 8 t/m2 at the ground surface . find the vertical pressure at 5 m below the centre and corner of the loaded area.

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

(a) A group of 16 piles of 600 mm diameter is arranged in a square pattern with c/c spacing of 1.2 m. the pilkes are 10 m long and are embedded in soft clay with cohesion of 30 kN/m^2 . Bearing resistance may be neglected for the piles. Adhesion factor is 0.6. determine ultimate load carrying capacity of the pile group.

(b) What are the cased cast-in-situ concrete piles . Explain any two of them with neat sketches.

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