Roll No. _____

5E5063

Total No of Pages: 3

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B. Tech. V Sem. (Main/Back) Exam., Nov.-Dec.-2016
Civil Engineering
5CE3A Geotechnical Engineering - I

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT – I

Q.1 (a) Derive relationship between bulk unit weight, specific gravity, void ratio and degree of saturation. Also write the expression for dry unit weight and saturated unit weight. [8]

(b) A moist soil sample has a mass of 633g and volume 300cm^3 at a water content of 11%. Taking G = 2.68, determine void ratio, degree of saturation. Also determine the water content at which the soil gets fully saturated without any increase in volume. [8]

OR

Q.1 (a) Define Degree of saturation, density index, percentage air voids and dry unit weight. [4]

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(b) A compacted soil sample with bulk density of 2.0 gkm³ has a water content of 15%. What are its dry density and degree of saturation? Assume G = 2.65. If the sample is allowed to get fully saturated without an increase in its volume, what would be its bulk density and water content? [12]

UNIT – II

Q.2 (a) Explain Darcy's law of permeability. Discuss its assumptions and limitations. [8]

(b) Describe various soil structures. [8]

OR

Q.2 (a) Drive an expression for determination of coefficient of permeability by pumping out test in unconfined aquifer. [8]

(b) Describe clay minerals. rtuonline.com [8]

UNIT – III

Q.3 (a) Explain the phenomenon of "Quick sand". [4]

(b) Plot the variation of total stress and effective stress for given soil system. [12]
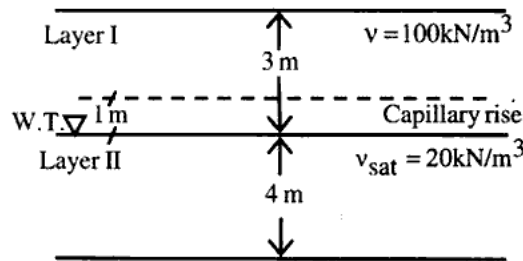
OR

Q.3 (a) Determine the seepage discharge through an earthen dam if the flow net has 10 equipotential drops and 4 flow channels. The length of the dam is 300m and k = 2.5×10^{-4} cm/sec. The water head is 8 m. [8]

(b) Derive an expression of Laplace equation for seepage through soil. [8]

UNIT – IV

Q.4 (a) Explain Mohr. Coulomb theory of shear strength. [8]

(b) The stresses on a failure plane in a drained test on a cohesionless soil are as follows:

$\sigma = 100 \text{ kN/m}^2$

$\tau = 40 \text{kN/m}^2$

Determine angle of shearing resistance and the angle, which the failure plane makes with the major principle plane. [8]

OR

Q.4 (a) Derive relationship between major and minor principle stresses at failure. [8]

(b) What are the advantages of triaxial test over other shear strength test. [8]

UNIT – V

Q.5 (a) Describe the effect of adding lime to soil on its engineering properties. [8]

(b) Describe the process of lime soil stabilization in field. [8]

OR

Q.5 (a) Describe Modified Proctor Test of compaction. Compare it with standard Proctor Test. [8]

(b) Find the moisture content necessary to fully saturate the soil having a dry density of 1.70 g/cm^3. Assume G = 2.70 [4]

(c) Explain placement water content and its significance in field. [4]