

5E5063

Roll No. _____

Total No of Pages: **3****5E5063****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. NIL2. 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]

- (b) A compacted soil sample with bulk density of 2.0 g/cm^3 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

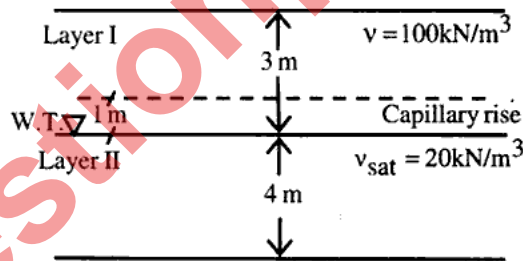
- Q.2 (a) Explain Darcy's law of permeability. Discuss its assumptions and limitations. [8]
 (b) Describe various soil structures. [8]

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 $k = 2.5 \times 10^{-4} \text{ cm/sec}$. 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]
