

320652(20)

**BE (6th Semester)
Examination, Nov.-Dec., 2017
(New Scheme)**

Geotech Engineering-II

Time Allowed : 3 hours

Maximum Marks : 80

Minimum Pass Marks : 28

- Note :** (i) Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d) of each question. Draw neat diagram wherever necessary.
- (ii) The figures in the right-hand margin indicate marks.

Unit-I

1. (a) What is stability number? [2]
- (b) What are the types of failure? Explain it in detail. [7]
- (c) Give a brief outline on the friction circle method in stability of slopes. [7]
- (d) A 8-meter deep cutting has side slopes of 1½ H : 1 V. The soil was tested and found to have the following properties :
C=24.5 kN/m², e = 0.80, φ = 14°.

Determine the factor of safety with respect to cohesion, against failure of the slope (i) when water level in the cut rises up to full height and (ii) when water level goes down suddenly. [7]

Given $G = 2.7$, and for $E = 34^\circ$, stability number (N) are

ϕ	N
6°	0.122
7°	0.116
14°	0.074

Unit-II

2. (a) Explain the following : [2]
 - (i) Plastic equilibrium
 - (ii) General state of plastic equilibrium
- (b) Derive the expression for coefficient of earth pressure at rest. [7]
- (c) Compute the intensities of active and passive earth pressure at a depth of 8 meters in dry cohesionless sand with an angle of internal friction of 30° and unit weight of 18 kN/m³. What will be the intensities of active and passive earth pressure if the water level rises to the ground level? Take saturated unit weight of sand as 22 kN/m³. [7]
- (d) Explain Rebhann's graphical method for active pressures. [7]

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Unit-III

3. (a) The permissible settlement is maximum in case of
- (i) isolated footing on clay
 - (ii) raft on clay
 - (iii) isolated footing on sand
 - (iv) raft on sand [2]
- (Choose the correct one)

- (b) Define the following : [7]

- (i) Foundation soil
- (ii) Net pressure intensity
- (iii) Net safe bearing capacity
- (iv) Safe bearing capacity
- (v) Allowable bearing capacity
- (vi) Effective surcharge at the base level of foundation

(vii) Footing <http://www.csvtuonline.com>

- (c) The load settlement curve data from a plate load test on a sandy soil are as under :

Load(t/m^2)	10	20	30	40	50	60	70	80
Settlement (mm)	4.5	10	15.5	22	29	38.5	50	64

The size of the plate used was 0.3m×0.3m. Determine the size of the square column footing to carry a net load of 250 t with a maximum settlement of 25 mm. [7]

- (d) Explain in brief the SPT method for determining safe bearing capacity of soils. [7]

Unit-IV

4. (a) What is 'Skin friction'? [2]
- (b) Explain shapes and components parts of well foundation with sketches. [7]
- (c) Describe methods for determining load carrying capacity of piles in—
- (i) clay soil;
 - (ii) sandy soil. [7]
- (d) In a 16-pile group, the pile diameter is 0.4 m and centre to centre spacing of piles in the square group is 1.5m. If $C_u=50$ kN/ m^2 , determine whether the failure would occur as a block failure or when the piles act individual. Neglect bearing at the tip of the pile. All piles are 12 m long. Take $\alpha = 0.7$ for shear mobilization around each pile. Also determine the safe load on this group. [7]

Unit-V

5. (a) What is an expansive soil? Where is it found in India? [2]
- (b) What are the design criteria of foundation on expansive soil? [7]
- (c) What are the problems associated with contaminated and expansive soil? [7]
- (d) Define the following : [7]
- (i) Swelling potential
 - (ii) Free swell
 - (iii) Differential free swell