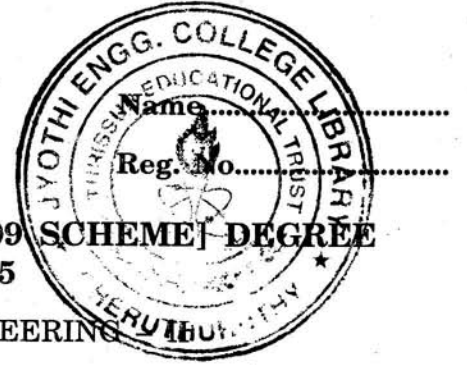


C 80768

(Pages : 2)



**SIXTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE
EXAMINATION, APRIL 2015**

CE/PTCE 09 604—GEOTECHNICAL ENGINEERING

Time : Three Hours

Maximum : 70 Marks

Assume suitable data wherever necessary.

Part A

Answer all questions.

1. (a) Sketch the distribution of stress within the soil along a horizontal and vertical plane due to a point load on the surface.
- (b) What is the approximate percentage of reduction of bearing capacity of a footing in pure sand because of full submergence ?
- (c) What are the different types of settlements that can occur in foundations ?
- (d) What do you understand by 'Group efficiency of piles' ?
- (e) What is a fully compensated foundation ?

(5 × 2 = 10 marks)

Part B

Answer any four questions.

2. (a) Explain Westergaard's theory for determination of the vertical stress at a point. How is it different from Boussineq's theory ?
- (b) Explain the factors influencing the bearing capacity of soil. How will you improve the bearing capacity of soil ?
- (c) Distinguish between a strap and a trapezoidal combined footing.
- (d) Draw the apparent pressure diagram for braced cut in clay.
- (e) State the factors which influence the spacing and depth of boring. What is the significance of depth of exploration in soil investigation ?
- (f) A building is to be supported by a raft foundation 20 m. × 10 m. The weight of the building and the load it can carry to be 3,000 kN. The subsoil is clay with a unit wt. of 20 kN/m.³ and an u.c.c. of 70 kN/m.² The FOS against bearing capacity failure is 3.0. At what depth should the raft foundation be placed ? Use Skempton's equation.

(4 × 5 = 20 marks)

Turn over

Part C

Answer all questions.

3. (a) A water tank weighing 1,500 kN is resting on three columns forming an equilateral triangle of side 6 m. Determine the vertical stress below one of the column at a depth 5 m. Use Boussinesque's theory.

Or

- (b) What do you understand about disturbed and undisturbed sample? How would you obtain undisturbed samples? Discuss various types of soil sampling for obtaining undisturbed soil samples.
4. (a) A strip footing of 2 m. width is founded at a depth of 4 m. below the ground level. Determine the net ultimate bearing capacity using (i) Terzaghi's equation, (ii) Skempton's equation and (iii) IS code. The soil is clay ($\phi = 0$, $c = 10 \text{ kN/m}^2$) Unit wt. of soil is 20 kN/m^3 .

Or

- (b) A 3.0 m. square footing is located in a dense sand at a depth of 2.0 m. Determine the ultimate bearing capacity for the following water table positions (i) at ground surface; (ii) at a footing level and (iii) at 1 m. below the footing. The moist unit wt. of sand above the watertable is 18 kN/m^3 and the saturated unit weight 20 kN/m^3 . $C = 0$, $\phi = 35^\circ$, $N_q = 33$ and $N_\alpha = 34.0$.
5. (a) The following data were obtained from plate load test carried out on a 60 cm. square test plate at a depth of 2 m. below ground surface on a sandy soil which extends upto a large depth :

Load intensity t/m^2	:	0	5	10	15	20	25	30	35	40
Settlement (mm.)	:	0	2	4	7.5	11	16	23	34	45

Determine the settlement of foundation 3.0 m. \times 3.0 m. carrying a load of 100 t. and located at a depth of 2 m. below ground surface. Water table is located at a larger depth from the ground surface.

Or

- (b) A trapezoidal footing is to support two square columns of 30 cm. and 50 cm. sides respectively. Columns are 6 m. apart and the safe bearing capacity of the soil is 400 kN/m^2 . The bigger column carries 5,000 kN and smaller 3,000 kN. Design a suitable size of the footing so that it does not extend beyond the faces of the column.
6. (a) Explain the procedure of design of raft foundation by conventional method.

Or

- (b) A square group of 25 piles extends to a depth of 10 m. in deposit of 20 m. thick stiff clay overlying rock. The piles are 0.5 m. in dia. and are spaced at 1 m. centre to centre in the group. The undrained shear strength of the clay at the pile tip is 180 kPa and the average value of the shear strength over the depth of the pile is 110 kPa. The adhesion factor is 0.45. Estimate the capacity of the pile group considering FOS of 3 against shear failure, $N_C = 9$.

(4 \times 10 = 40 marks)