Reg. No. :

Question Paper Code : X 60256

B.E./B.Tech. DEGREE EXAMINATIONS, NOV./DEC. 2020
Fifth Semester
Civil Engineering
CE 2305/10111 CE 505/CE 54 – FOUNDATION ENGINEERING
(Regulations 2008/2010)
(Common to PTCE 2305/10111CE505 – Foundation Engineering for BE (Part-Time) Fifth Semester – Civil Engineering – Regulations 2009/2010)

Time : Three Hours Maximum : 100 Marks

IS 6403 – 1981 Code book may be permitted.

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. Differentiate : Non representative and undisturbed samples.
2. How do you decide the depth of soil to a pan, which impedes rooting ? And also list the factors influencing it.
3. What is ultimate bearing capacity ?
4. What is net pressure intensity ?
5. Compute the critical depth for weak soil, if $\gamma = 18.4$ kN/m^3 and $q_u = 24$ kN/m^2 for the 4 m × 5 m size floating foundation.
6. In which situation are raft foundation are used ?
7. How piles are classified based on method of installation ?
8. What are the limitations of the dynamic pile load formula ?
9. Why only granular materials are preferred for the backfill of a retaining wall ?
10. How do tension cracks influence the distribution of active earth pressure in pure cohesion ?

PART – B **(5×16=80 Marks)**

11. a) Explain any two Geophysical methods of site exploration.

(OR)

b) Explain any two types of soil samplers.

12. a) i) Compute the ultimate load that an eccentrically loaded square footing of width 2 m width an eccentricity of 0.315 m can take at a depth of 0.45 m in soil with $\gamma = 17.75$ kN/m^3, C = 9 kN/m^2 and $\varphi = 35°$, $N_c = 52$, $N_q = 35$ and $N_\gamma = 42$. **(8)**

ii) Write the step by step procedure for IS code method for computing bearing capacity in shallow foundation. **(8)**

(OR)

b) i) Explain in detail the types of bearing capacity failures and write the assumptions made in Terzaghi analysis. **(8)**

ii) A rectangular footing of size 3 × 6 m is founded at a depth of 2 m in medium dense sand of angle of friction $\varphi = 36°$. The soil is submerged upto base level and in saturated above. The saturated unit weight of sand is 18 kN/m^3 determine q_d for the following cases.

1) The loading is vertical and symmetrical.
2) The loading is symmetrical but inclined at an angle of 20° to the vertical parallel to the shorter side.
3) The loading is vertical and acts at an eccentricity of 0.5 m in both the length and width direction of the footing. **(8)**

13. a) i) A combined footing is to support two columns 250 mm × 250 mm and 300 mm × 300 mm carrying loads of 300 kN and 450 kN respectively. The columns are spaced at 4 m c/c. The allowable bearing capacity of the soil is 150 kPa. Find the plan dimensions of the footing if

1) The first column alone is on the boundary line.
2) Both the columns are on the boundary line. **(10)**

ii) Draw the contact pressure distribution diagram for flexible and rigid footings resting on sand Clay respectively. **(6)**

(OR)

b) i) Proportion a strap footing to carry loads of 750 kN and 400 kN through columns of sizes 400 mm × 400 mm and 250 mm × 250 mm respectively. The columns are spaced at 5 m c/c and the second column in on the boundary line. The width of the footing could be assumed are 2.2 m. The allowable bearing capacity of the soil is 250 kPa. **(6)**

ii) What is meant by floating foundation ? When is it adopted ? Find the factor of safety for such a foundation against shear failure. Also find the theoretical settlement of the foundation. **(10)**

14. a) Explain with neat sketches about pile load test method of determination of load carrying capacity of piles. **(16)**

(OR)

b) Determine the group efficiency of a pile group consists of 16 piles of each 20 m long and diameter with c/c distance on both directions equal to 1.0 m which are embedded on a clay deposit having cohesive strength of 35 kN/m^2 by static method. Feld's rule and converse Labara formula. Take adhesion factor as 0.6. **(16)**

15. a) A vertical retaining wall of height 6.5 m retains a non-cohesive level backfill weighing 19.2 kN/m^3, with the angle of friction being 18°. Compute the total thrust on the wall adopting Culmann's graphical method. Later it is planned to place a piece of machinery weighing 30 kN on the surface, parallel to the crest of the wall. Find the minimum horizontal distance from the back of the wall at which the machinery could be placed without increasing the pressure on the wall. Take ϕ= 30°.

(OR)

b) For the cantilever retaining wall shown in fig. 15(b), determine the maximum and minimum pressure under the base of the cantilever. The relevant shear strength parameters of the backfill and foundation soil are C′ = 0, γ= 35° and unit weight of the soil γ = 17.5 kN/m^3. The unit weight of the wall material is 23.5 kN/m^3. Find also the factor of safety against sliding, considering the reduced value of base friction as $\frac{2}{3}\phi$.

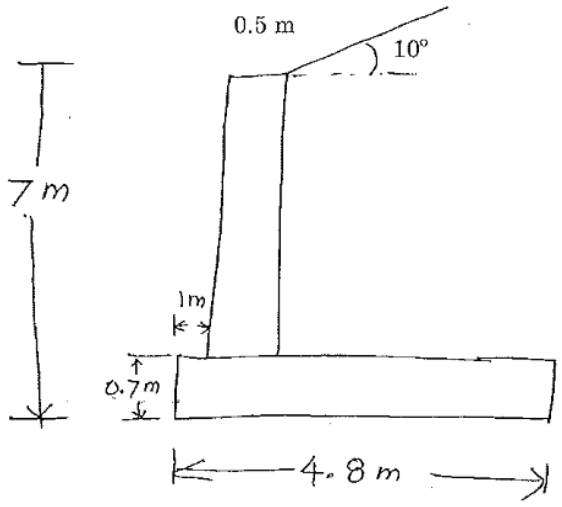

Fig. 15(b)