Roll No. | | | | | | | | |

B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2012

CIVIL ENGINEERING

(10)

Seventh Semester

CE 9403 Ground Improvement Techniques

(Regulation 2008)

Time : 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. What are the factors governing the choice of method of ground improvement.
2. State the limitations of well point system.
3. Estimate electro-osmatic discharge , if the well spacing is 2m, depth of clayey soil to be stabilized is 4m and the potential gradient is 0.5 volts/cm. Assume $K_e = 0.5 \times 10^{-4}$ cm/sec per volt/cm.
4. What is suitability number?
5. Under low pressure range, the compressibility of dry side compacted soil is lesser than wet side compacted soil of same initial void ratio. Why?
6. Bring out the advantages and limitations of Preloading technique.
7. List the various types of reinforced earth wall.
8. What are the various functions of geosynthetic materials in geotechnical field.
9. What are the requirements for an ideal grouting material.
10. Distinguish between permeation and compaction grouting.

Part – B (5 x 16 = 80 marks)

11. i). Write short notes on the role of ground improvement in Foundation Engineering **(6)**

    ii). Discuss briefly the geotechnical problems in black cotton and alluvial soil deposits **(10)**

12. a) i). State different dewatering systems and explain well point system of dewatering. **(8)**

    ii). Explain the arrangement and operation of vacuum dewatering **(8)**

    OR

    b) Derive the governing equation which provides the relation between head and discharge for the condition of gravity flow and artesian flow from a source to a slot, which are parallel to each other.

13. a) Estimate the load carrying capacity of single stone column of diameter 750mm and length of 10m installed in a soft clay bed having undrained cohesion of 30kN/ m^2 and $\mu = 0.4$. The load is applied through a circular plate of 1.6m diameter. Stone is compacted to dense state to offer frictional resistance angle of 41°. Assume saturated unit weight of soil is 20kN/ m^2 and the area is in submerged condition.

    OR

    b) i). Bring out the advantages and limitations between lime column and stone column **(4)**

    ii). It is proposed to adopt sand compaction pile to increase the relative density of sand from loose state to dense condition. The void ratio of deposit at its loose

(Contd...)

state is 0.85 and is proposed to reduce to 0.35. Determine the relation to radius and spacing of sand compaction piles if it is proposed to arrange in a square pattern. **(4)**

iii). State various methods of forming stone column and explain any one with suitable sketches. **(8)**

14. a) A retaining wall of 8 m height is reinforced with strip reinforcements of width 75mm. The strips are placed at a horizontal spacing of 1m and vertical spacing of 0.4m. The selected backfill is sand having ϕ=30° at unit weight of 16.6 kN /m^3. The foundation soil is clay with undrained cohesion of 52 kN /m^2, ϕ=28° and unit weight of 18 kN /m^3. Check for external and internal stability of the wall. Assume f_y = 240 MPa, soil-tie friction angle δ= 20°,FS(B)=3, FS(P)=3, N_c =25.8 and N_γ =16.72.

OR

b) i). State different functions of geotextiles and explain any two with suitable examples. **(8)**

ii). What is Reinforced Earth? Mention various reinforcing materials that can be used in soils and their merits and demerits. **(8)**

15. a) i). Write short notes on suspension grouts and solution grouts. **(6)**

ii). State different injection methods of grouting and explain any one in detail. **(10)**

OR

b) Explain in detail the lime stabilization and cement stabilization of soil and bring out their engineering benefits.