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**Question Paper Code : 21225**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Seventh Semester

Civil Engineering

CE 2033/CE 708/10111 CEE 28 — GROUND IMPROVEMENT TECHNIQUES

(Regulation 2008/2010)

(Common to PTCE 2033 – Ground Improvement Techniques for B.E. (Part-Time)  
Sixth Semester Civil Engineering – Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Identify the various geotechnical problems in alluvial soil deposits?
2. What do you understand the term 'Reclamation Material?' and name any materials of this kind.
3. What are the criteria that need to be satisfied for the selection of drain material in a drainage system?
4. List the various components of drain with a neat sketch.
5. What basis the in-situ cohesionless soils are stabilized? and name few techniques that are used to stabilize this type of soils.
6. How to assess the suitability of backfill materials used in vibroflotation method?
7. What is soil reinforcement and name any type of materials used for soil reinforcement?
8. What are the various applications of geosynthetics in railways?
9. What is groutability ratio?
10. What principles to be followed in choosing the grout for ground stabilization?

PART B — (5 × 16 = 80 marks)

11. (a) What are the various effect that contributes on possible alterations of ground after formation and discuss in details. (16)

Or

- (b) (i) Discuss in details the various factors that must be considered in the selection of best ground improvement technique. (10)
- (ii) Explain in detail the black cotton soils. (6)
12. (a) (i) In order to estimate the seepage loss through the foundation of a sheet pile wall, a flow net analysis was performed and results of the flow net analysis gave a number of flow line  $N_f=8$  and number of drops  $N_d=16$ . The head of water lost during the seepage was 4 m. Assume the coefficient of permeability of the soil is  $k = 5 \times 10^{-5}$  m/min. Estimate the seepage loss per meter length of the sheet pile wall per day. Also estimate the exit gradient if the average length of the last flow field is 0.7 m. (8)
- (ii) Write a detailed note on various drains that are to be adopted for controlling surface water. (8)

Or

- (b) It is required to design the dewatering system for the proposed construction at a particular site, explain in details of different steps involved for design of dewatering system to the proposed site. (16)
13. (a) (i) How to improve the engineering characteristics of sand using dynamic compaction method and state the various merits of this method? (8)
- (ii) What is vibro displacement compaction? and give examples for this type of compaction. Also discuss any one method in details. (2+2+4 = 8)

Or

- (b) (i) Explain in details of various factors that have to be considered for achieving the best performance of stabilizing clay by using the preloading technique. (8)
- (ii) How do you monitor compression of soils during preloading by various methods and briefly discuss each method in detail. (8)

14. (a) Earth retaining wall has used to support a 10 m height granular backfill having  $\phi = 30^\circ$   $\gamma = 17.0 \text{ kN/m}^3$  is reinforced with galvanized steel strip. The steel strip width 'w' = 80 mm, the vertical and horizontal spacing between the strip from c/c is 0.5 m and 1 m respectively. The breaking strength of the steel ' $f_y$ ' =  $2.5 \times 10^5 \text{ kN/m}^2$  and relative friction angle ' $\delta$ ' =  $20^\circ$ . The foundation soil is having  $\phi = 28^\circ$ ,  $\gamma = 19.0 \text{ kN/m}^3$ ,  $c = 40 \text{ kN/m}^2$   $N_c = 25$  and  $N_\gamma = 16.7$ . Assume the factor of safety against breaking and pull out is 3. Check for the external and internal stability of the wall. Assume the corrosion rate of the galvanized steel to be 0.025 mm/year and life span of the structure to be 50 years. (16)

Or

- (b) (i) List various types of compression reinforcement used to increase the bearing capacity of soil and discuss any one method in detail. (8)
- (ii) What basis soil reinforcement helps in improving the stability of an embankment? and list various sequences involved in the construction of reinforced embankment? (2+6=8)
15. (a) Briefly discuss in details of various stage wise procedures are to be followed for ground treatment using grouting method. (16)

Or

- (b) What are the various aspects of grouting? and briefly explain different types of materials used for grouting. (6+10=16)