Total Pages—5

May – 2015

(Set-1)

M.Tech-2nd

Ground Improvement Technique

Full Marks : 70

Time : 3 hours

Answer any **six** questions including **Q.No.1**

The figures in the right-hand margin indicate marks

1. Answer the following questions : 2 × 10

(*a*) What do you mean by step grouting ?

(*b*) What is groutability ratio and how would you determine it ?

(*c*) What are the factors that affect bituminous stabilization ? Justify your answer.

(*d*) Which ground improvement technique would you prefer in swelling type of Soil and why ?

(*e*) What is the basic mechanism of ground improvement using stone column.

(Turn Over)

(*f*) In which types of soil dynamic compaction method is most preferable and why ?

(*g*) What are the main functions of Geosynthetics in various civil engineering structures.

(*h*) Give atleast five conditions, where you suggest micropiling for ground improvement.

(*i*) Name atleast five factors with proper justification that will influence the effectiveness of thermal stabilization/ ground freezing.

(*j*) Explain with the help of a net sketch, the functioning of multistage well points system for dewatering.

2. (*a*) What is vacuum consolidation and how it is different from the surcharging or preloading ? Give a comparison between these two methods. 5

(*b*) How would you determine the effective depth of soil improvement using dynamic compaction ? List down the factors with proper justification, on which the effectiveness of this method would depend upon. 5

3. (*a*) A slot is made in an unconfined aquifer to drain water. The flow to the slot occurs from both sides. If the water table is at a height of 12 m above the base and the drawdown is 4m, Find the discharge per metre length, assuming that the distance of the slot from both sides is 100 m. Take $K = 5 \times 10^{-4}$ m/sec. 5

(*b*) Explain different grouting methods based upon the types of treatment ? 5

4. (*a*) What is a stone column and how does it help to improve the ground condition ? Write down the installation procedure of stone column in field with net sketch. Also point out the merits and demerits of this method and the various geotechnical issues involved in this technique. 5

(*b*) Draw a net sketch and explain various components of a reinforced retaining wall. Also write designing approach for the reinforced retaining wall. 5

5. (*a*) Explain the suitability of different ground improvement techniques for different types of soils. Also mention about the effective depth of treatment economical area of treatment and the time required for each of these methods. 5

(*b*) What is the difference between permeation grouting, compaction grouting and jet grouting ? Explain in details. 5

6. (*a*) Write down the different types of rollers used for compaction as per their applicability to different types of soils ? How would you control field compaction for road project ? 5

(*b*) Which of the ground improvement techniques are most suitable for prevention of liquefaction in soils ? Justify your answer. 5

7. (*a*) How does electro-osmosis help in ground improvement ? Write down the merits and demerits of this method and the engineering issues related to this technique. 5

(*b*) Explain in details about the various dewatering techniques available that will facilitate the ease of construction ? 5

8. (*a*) What is the difference between chemical stabilization and mechanical stabilization ? What are the factors on which the effectiveness of soil stabilization would depend upon ? 5

(*b*) What are the various ground improvement techniques for densifying loose granular soil existing at deeper depths ? 5