

Registration No :

--	--	--	--	--	--	--	--	--	--

Total Number of Pages : 02

B.Tech  
PCI7J002

7<sup>th</sup> Semester Regular / Back Examination 2019-20

GROUND IMPROVEMENT TECHNIQUE

BRANCH : CIVIL

Max Marks : 100

Time : 3 Hours

Q.CODE : HRB019

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Only Short Answer Type Questions (Answer All-10) (2 x 10)

- Which types of ground improvement technique would be used in black cotton soil and why?
- Define swelling potential of an expansive soil. How is it related to plasticity index?
- What are differences between sand drains and sand wicks?
- What is grouting? What are the desirable characteristics of grouts?
- When and why deep surface compaction control tests are resorted?
- Define suitability number of a backfill. Determine the suitability of a backfill of which  $D_{50}=1$  mm,  $D_{20}=0.5$  mm,  $D_{10}=0.08$  mm.
- What are the causes for which ground improvement techniques are under taken?
- What do you mean by step grouting?
- List out the major functions of geo-synthetics.
- Which type of soil is suitable for lime fly ash stabilization?

Part- II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Describe with neat sketch, the installation procedure of vibroflotation method.
- What do you mean by electro-osmosis method?
- What are the factors which influence the effectiveness of thermal stabilization/ground freezing?
- Discuss briefly the design consideration of dynamic compaction method.
- Explain the mechanism of cement stabilization. What are the different factors affecting the strength of cement stabilized soil? Discuss tem briefly.
- In a dry sandy gravel ascending stage, grouting is carried out in stages of 2 m starting from 10 m depth and moving upwards to 8 m, 6m, and 4 m depth below the ground surface. Determine the maximum permissible grout pressure at 10 m depth. Also, determine the amount of decrease in pressure for each stage of ascent of grouting. The soil has  $\gamma_t=17.5$  kN/m<sup>3</sup>,  $\phi=35^\circ$  and  $K_0=0.40$ .
- Discuss the parameters on which groutability of soil mass depends.
- What are 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?
- What are various dewatering techniques which are generally used for ground improvement? Discuss in brief.
- How stone columns help soil stabilize and gain bearing capacity?
- Explain Permeation grouting.
- Explain with the help of net sketch, the function of multi stage well point system for dewatering.

**Part-III**

**Only Long Answer Type Questions (Answer Any Two out of Four)**

**Q3** Distinguish with suitable illustrations, between vibrocompaction and compaction pile for ground improvement in granular soil. Indicate some field situations where these techniques are suitable. **(16)**

**Q4** Sand drain of diameter 24 cm with spacing 2.4 m c/c are installed in a soil layer of 7 m thickness over impermeable rock strata. The soil has  $m_v = 0.8 \times 10^{-4} \text{ m}^2/\text{kN}$  and  $C_v = C_h = 2.2 \text{ m}^2 \text{ per year}$ . A uniform vertical stress of  $60 \text{ kN/m}^2$  is applied suddenly to the surface over a very wide area. Determine the amount of final consolidation settlement and the time required to reach 50 % of the total settlement for the cases of :

- (a) without sand drains in place
- (b) with sand drains in place. Given that  $T_r = 0.13$

**Q5** Compare the advantages and disadvantages of ascending stage and descending stage grouting .What are the application of grouting? **(16)**

**Q6** What are the different modes of failure of reinforced embankment? Discuss with sketches step by step method of design of reinforced earth wall. **(16)**