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Total Number of Pages : 02

B.Tech.  
PCI7J002

7<sup>th</sup> Semester Regular Examination 2018-19

GROUND IMPROVEMENT TECHNIQUE

BRANCH : CIVIL

Time : 3 Hours

Max Marks : 100

Q.CODE : E034

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

- Define and explain Collapse potential of a soil.
- Explain what you mean by depth of active zone.
- Show the differences between sand piles and sand drains.
- What are the advantages of soil nailing?
- State the most important property required for deciding the spacing of sand drains in a soft clay deposit.
- An SPT blow count  $N = 50$  is typical for which type of soil?
- What is a land fill?
- What do you mean by dynamic compaction? How does it help you in dealing with earthquake forces?
- What is the cement content requirement for different types of soils?
- Name a few waste materials generally used for ground modification.

Part- II

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

- What is the necessity of compaction? Discuss the ways and means for cement stabilization of a soil.
- Distinguish between methods of impact used in densification of granular soil deposit at ground surface and at depth.
- What do you mean by accelerated pre-consolidation of clays? How is it achieved? Discuss the use of sand drains and sand wicks for the purpose.
- A 20 m diameter tank exerts a pressure of 150 kPa on a 6 m thick layer of sand. The ground water table is at the surface. The average cone resistance recorded was 22 MPa. Estimate the settlement.
- Using 300 mm diameter plate, additional settlement of 3 mm was recorded for a pressure increase of 80 kPa. Calculate the coefficient of subgrade reaction and corresponding Young's modulus.
- What are various dewatering techniques which are generally used for ground improvement? Discuss in brief.
- What do you mean by grouting? How penetration grouting is different from permeation grouting? Discuss various applications of grouting.
- Calculate the transmissivity of a geo-net using the following laboratory test data: flow rate per unit width,  $q = 0.70 \times 10^{-4} \text{ m}^2/\text{sec}$  and hydraulic gradient,  $i = 0.05$ .
- How stone columns help soil stabilize and gain bearing capacity? Discuss.

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- j) List and discuss four physical characteristics of a grouting liquid relevant to engineering applications.
  - k) Discuss the use of a impact roller in densifying the soil to carry the earthquake loads.
  - l) What measures you will take before you start constructions in an expansive soil, a soft soil and a collapsible soil? Explain in brief.
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**Part-III**

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

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- Q3** What is the necessity of compaction? How does it differ from consolidation? Discuss the ways and means for lime stabilization of a soil. Discuss various compaction control tests in detail. When and why deep surface compaction control tests are resorted to? Explain. **(16)**
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- Q4** A soil profile has an active zone of expansive soil of 3 m. The liquid limit and average natural moisture content during the construction season are 54% and 20% respectively. Determine the free surface swell. What measures you will take before you start constructions in an expansive soil, a soft soil and a collapsible soil? Explain in brief. **(16)**
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- Q5** Enumerate various geo-synthetics commonly used for ground improvement techniques? What is a geo-net? What are various properties of a geo-textile which are generally taken into consideration before their use? What are the desirable properties? Differentiate between transmissivity and permittivity? What are various tests conducted on the geo-textiles before their use? Calculate the transmissivity of a geo net using the following laboratory based data; (i) Flow rate per unit width,  $q = 0.72 \times 10^{-4} \text{ m}^2/\text{s}$ , (ii) Hydraulic gradient,  $I = 0.05$ . **(16)**
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- Q6** How do you estimate the bearing capacity of foundations on sanitary land fills? How earthquake drains and blasting help soil stabilize and gain bearing capacity? **(16)**

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