

Roll No.

Total No. of Pages : 02

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**M.Tech.(Geo Technical Engineering)/
M.Tech. (Soil Mechanics & Foundation Engineering) (2013 & Onwards)
(Sem.-1)**

GROUND IMPROVEMENT

Subject Code : CESE-9

M.Code : 37214

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

1. a) Discuss the mechanism of granular columns to improve the properties of ground with neat sketches. 10
 b) A surcharge fill has a volume of 5000m^3 and is placed at a dry density of 20kN/m^3 . The borrow source for the fill has a dry unit weight of 16.2 kN/m^3 and $G = 2.70$. Estimate the volume of material required from the borrow to the make the surcharge fill. 10
2. a) Describe in detail the blasting technique of densifying the soil strata. Why is cratering undesirable in process? 12
 b) What do you mean by the technique of heavy tamping? Explain in brief. 8
3. Design a suitable layout of grid reinforcement for the 6m high vertical soil wall. The properties of the wall and backfill are given below : 20

Wall fill	Back fill
$C_1 = 2\text{kN/m}^2$	$C_1 = 3\text{kN/m}^2$
$\phi = 38^\circ$	$\phi = 44^\circ$
$\gamma_1 = 18\text{kN/m}^3$	$\gamma_1 = 13\text{kN/m}^3$
$\gamma_{s1} = 25\text{kN/m}^3$	$\gamma_{s1} = 20\text{kN/m}^3$

The water table is 2m above the base of the wall. The backfill and wall has a surcharge of 8kN/m^2 .

4. a) Describe a method suitable to stabilize a highway in hilly terrain with high rainfall. 8
b) Explain in detail the principle of ground anchors and their types in detail. 12
5. a) Explain how pre-wetting technique is useful in improving the properties of the soil. 12
b) Write a note on grouting methods. 8
6. a) Write a note on vacuum dewatering. 10
b) Explain the criterion for selection of fill material around drains 10
7. a) Explain how electro-osmosis technique is effective in improving the behaviour of expansive soils. 12
b) Explain the criterion for selection of fill material 8
8. Write short notes on the following :
a) Gypsum stabilization 7
b) Foundation techniques in expansive soils 6
c) Components of Reinforced Earth 7

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.