Menoufia University
Faculty of Engineering
Shebin El-Kom
Dept. : Civil Engineering
Semester : First-Final Exam
Academic Year: 2016-2107

Minufiya University

Postgraduate: Diploma
Subject: Improvement of Soil Properties
Code No. : CVE 517
Date: 08/01/2017
Time Allowed: 3.00 hours
Total Marks: 100

Answer of the following questions and assume any missing data

Question(1) (25)

1-a) Vibroflotation technique is one of the used method in soil improvement, show schematically the used procedure for this technique.

1-b) Compare between required geotechnical investigation for ground improvement project and a regular construction project.

1-c) Throughout the construction of an earth dam , the following data are registered as follows:
1- Soil from borrow pit has natural density = 1.8 gm/cm^3, water content = 12 %.
2- Soil after compaction has density = 2.1 gm/cm^3, water content = 16%.
Estimate the quantity of soil to be excavated from the borrow pit and the amount of water to be added for every 1000 cm^3 of compacted soil of the earth dam.

1-d) Explain in details the six primary functions of geosynthetics.

Question(2) (25)

2-a) Explain the used methods for monitoring compaction in field.

2-b) Make a comparison between mechanical stabilization and chemical stabilization.

2-c) What is the equivalent sand drain diameter of a wick drain measuring 80 mm wide and 3.0 mm thick that is 60 % void in its cross section? Use an estimated porosity of 0.4 for typical sand in sand drain.

2-d) Explain how slope stability can be enhanced.

Question(3) (25)

3-a) Differentiate between surface and deep compaction for improving soil properties.

3-b) List the studied methods of soil improvement.

3-c) During execution of site investigation program at site in 6th October city, a loose sand layer starting from ground surface and extend up to 12 m down .A drooping of a heavy weight was used as one of soil improvement techniques. Design the system to achieve a depth of compaction using Leonard's formula ($D = 0.5\ (W \times h)^{1/2}$).

3-d) Make a schematically diagram for the Vidal reinforced earth system.

Question(4) Choose the correct answer for the following: (25)

1- Common ways to dealing with unsatisfactory soils include:
a- Bypassing the soil.
b- Removing & replacing the unsuitable soil.
c- Redesign the project.
d- Improving the soil properties.
e- Any one of the above.

2- Depth of compaction for soil using dropping of a heavy weight can be reached up to:
a- 12 m.
b- 5 m.
c- 20 m.
d- 30 m.

3- Index tests can be used for:
a- Product comparison & quality control purposes.
b- Actual design.

c- Direct assessment of the property of interest.

4- Blasting has been used to densify loose granular soils with a maximum percentage of :
   a- 15 %.
   b- 10 %.
   c- 25 %.

5- Preloading is a technique that can successfully used to densify:
   a- Soft cohesive soils.
   b- Cohesionless soils.
   c- Cohesive and cohesionless soils.

6- Lime stabilization has been extensively used to:
   a- Decrease swelling potential.
   b- Decrease swelling pressure.
   c- Decrease plasticity.
   d- Any one of the above.

7- Bituminous materials improve:
   a- Bearing capacity and soil strength of cohesive soils.
   b- Waterproof of cohesive soils.
   c- Cementing sand and produces strong and coherent mass.
   d- Any one of the above.

8- Methods of studied soil improvement in this course include:
   a- Mechanical & dynamic compaction.
   b- Vibrofloating and/ or preloading.
   c- Geosynthetics.
   d- Admixtures.
   e- All of the above.

9- Lime has been used as a stabilizer for soils in:
   a- Base courses of pavement systems.
   b- Under concrete foundation.
   c- On embankment slopes.
   d- Canal lining.
   e- Any one of the above.

10- All geosynthetics specification should include:
   a- General requirements.
   b- Specific geosynthetic properties.
   c- Placement procedures & overlaps.
   d- Acceptance and rejection criteria.
   e- All of the above.

11- Types of dynamic compaction for deep layers of soil are:
   a- Vibroflotation.
   b- Dropping of heavy weight.
   c- Blasting.
   d- All of the above.

12- Chemical modification is used to:
   a- Improve soil workability.
   b- Reduce plasticity and shrink-swell potential.
   c- Waterproofing and dust proofing.
   d- One or all of the above.

13- An example of vertical drains to be considered with preloading is:
   a- Cylindrical sand drains.
   b- Cylindrical cement drains.
   c- Stone columns.

14- The purpose of injecting a grout is:
   a- To decrease permeability.
   b- To increase shear strength.
   c- To decrease compressibility.
   d- One or all of the above.

15- In geosynthetics applications, overlap should be:
   a- A minimum of 30 cm.

b- Not less than 15 cm.
c- Variable per each product.

16- As stated by Bowles, 1996, stone columns are not applicable to:
a- Thick deposits of peat.
b- Highly organic silts.
c- Highly organic clays.
d- All of the above.

17- Geosynthetics are:
a- Planar products.
b- Polymeric materials.
c- Used with geotechnical-related material.
d- All of the above.

18- In cement stabilization, cement requirements depends on:
a- Gradation of the soil.
b- Soil strength.
c- Mixing time.

19- Blending of materials is:
a- To provide stronger or less compressible material.
b- Improvement of the gradation of soils to meet design or specs.
c- To provide a material less permeable.
d- One or all of the above.

20- Geomembranes are primarily used for:
a- Fluid barriers.
b- Separation.
c- Reinforcement.
d- All of the above.

21- Soil stabilization is:
a- Any process of altering unsuitable in situ soil to improve selected engineering characteristics.
b- Changing soil type.
c- Remove water from soil.
d- Modifying soil minerals.

22- Dropping of a heavy weight known as :
a- Deep dynamic compaction.
b- Surface compaction.
c- Static compaction.

23- The choice of a roller for compaction in the field depends on:
a- Type of soil to be compacted.
b- Percentage of compaction to be obtained.
c- Moisture content.
d- All of the above.

24- Advantages of using wick drains:
a- Installation is simple.
b- There is only nominal resistance to the flow of water.
c- Tensile strength is definitely offered to soft soil.
d- The analytic procedure is available and straightforward in use.
e- All of the above.

25- Compaction is:
a- Artificial densification of soil masses.
b- Natural densification of soil layers.
c- Mixing soil with water and aggregates.

With our best wishes

This exam measures the following ILOs															
Question Number	Q1-a	Q2-a	Q2-c,d	Q3-a	Q4		Q1-c, Q1-d	Q2-b	Q3-b	Q3-d	Q4		Q1-b	Q3-c	Q4
Skills	dk3-1	dk3-1	dk3-1	dk3-2	dk3-2		di5-1	di2-1	di5-1	di2-1	di2-1		dp1-2	dp1-1	dp1-2
	Knowledge &Understanding Skills						**Intellectual Skills**						**Professional Skills**		