M.TECH. DEGREE EXAMINATION
Model Question Paper - I
Branch: Civil Engineering
Specialization: Geomechanics and Structures
First Semester

MCEGS 103 ADVANCED SOIL MECHANICS

(Regular – 2013Admissions)

Time : 3 Hours Maximum: 100 Marks

Answer **all** *questions*

(For the candidates admitted from the year 2011 onwards)

1 . (a) Explain the following:-

i) IS classification of soil ii) Specific surface
ii) Isomorphous substitution iv) Diffused double layer v) Soil fabric
(5x3=15)

(b). Outline X-ray diffraction method for clay mineral identification (10)

OR

2. (a) Explain what is meant by 1:1 and 2:1 clay minerals? Give two examples each (10)

(b) Explain what is meant by Base Exchange capacity. What are the different types of bonds in clay particles. (15)

3(a) Explain how the swelling pressure is determined by conducting Oedometer test (7)

(b) The following compression readings were obtained in a consolidation test on saturated clay with specific gravity 2.7.

Pressure (kN/m^2):	0	54	107	214	429	858	1716	3432	0
Dial gauge (mm):	5	4.75	4.49	4.11	3.45	2.61	1.67	0.74	1.48

Initial thickness of the specimen was 19mm and at the end the water content was 19.8%.Determine the preconsolidation pressure. (10)

(c) Differentiate between constant rate of strain and constant gradient consolidation tests. (8)

OR

4 (a) Explain consolidation by sand drains (7)

(b) Explain equal strain consolidation with no smear (8)

(c) What is the effect of secondary consolidation on preconsolidation pressure (10)

5 (a) In a triaxial test, a soil sample was consolidated under a cell pressure of 700 kN/m^2 and a back pressure of 350 kN/m^2.Thereafter with drainage not allowed, the cell pressure was raised to 800 kN/m^2 resulting in the increased pore water pressure reading of 445 kN/m^2.The axial load was then increased to give a deviator stress of 575 kN/m^2(while the cell pressure remained at 800 kN/m^2) and a pore pressure reading of 640 kN/m^2.Calculate pore pressure coefficients (10)

(b)Explain Henkel's modification of pore water pressure equations (7)

(c) Explain the relation of undrained shear strength with effective overburden pressure (8)

OR

6 (a) Explain the shear strength of granular soils under plain strain condition? Give a simple correlation to obtain friction angle. (10)

(b) A compacted soil was tested in an undrained triaxial test using a cell pressure of 400 kN/m^2.Before the application of cell pressure, the pore pressures in the sample was zero.The following observations were made.

Strain (%):	0	2.5	5.0	7.5	10.0	12.5	15.0
Deviator stress (kPa):	0	570	950	1100	1150	1170	1140
Pore water pressure (kPa):	250	285	150	105	75	60	50

a) Determine the value of pore pressure coefficient B

b) Plot the variation of deviator stress with strain

c) Show how the pore pressure coefficient varies with strain (15)

7 (a) Explain the method of settlement prediction by Terzaghi's method from plate load test observations (10)

(b) Explain the effect of compaction on soil structure (7)

(c) Explain the preloading technique used for improving soil properties (8)

OR

8 (a) The relative compaction of a sand in the field is 93.5%.The maximum and minimum dry densities are 16.98kN/$m^3$and 14.46 98kN/m^3respectively. For field condition, determine dry unit weight. . (7)

(b) Explain the stress path method of settlement computation (10)

(c) Write a note on field compaction control (8)