

BENGAL ENGINEERING AND SCIENCE UNIVERSITY, SHIBPUR
BE (Civil) 8TH Semester, Final Examination, April 2013
Sub: Geotechnical Investigation and Practices (CE – 803/7)
(Elective – I)

Time: 3 hours

Full Marks: 70

Answer Question No. 8 and any FIVE from the rest.

1. i) Describe the Standard Penetration Test.
ii) What is the N-value of the Standard Penetration Test? Explain the various corrections to be applied to the observed N-value. How do you find relative density from N-value? (5+6)

2. i) Describe the objectives of sub-surface exploration.
ii) What are the various steps considered in the planning of a sub-surface exploration programme?
iii) State and explain the guidelines to decide the number and depth of boreholes required for sub-soil exploration. (3+4+4)

3. i) Vane shear tests carried out in a deposit of soft alluvial clay required a torque of 72.0 Nm. The overall diameter and height of the vanes are 100 mm and 200 mm respectively. Determine the value of the undrained shear strength. Assume one end shear of the soil.

ii) Following measurements were obtained from a seismic refraction test:

Distance of Geophone from source (m)	0	4	8	12	20	25
Travel time (milli sec.)	0	2	4	6	8	9

Determine the thickness of the layer.

(4+7)

4. Discuss geophysical exploration using electrical resistivity. How do the moisture content and the salt content affect resistivity value? (11)

5. i) Explain 'Undisturbed', 'Disturbed' and 'High quality' samples.
ii) What is thin walled sampler? Define and discuss Area ratio, Recovery ratio, inside clearance and outside clearance of cutting edge.
iii) Compute the area ratio of a thin walled tube sampler having an external diameter of 60 mm and a wall thickness 2.25 mm. Do you recommend the sampler for obtaining undisturbed sample? Justify your answer. (4+4+3)

6. i) Discuss the salient points in the description of rocks. Explain the difference between joints and fracture in rock mass.
ii) Define and discuss RQD, core loss and recovery ratio.
iii) A rock core sample of 55 mm diameter failed in a point load test at 1700 MN force. Estimate the unconfined strength of the rock. (4+3+4)

7. i) Water in bore hole bailed out to a depth of 10 m below the ground surface, and the water rise recorded on three successive days were 0.65 m, 1.25 m and 1.75 m from the bailed out level. Determine the location of ground water table in a deep clayey deposit.
- ii) A cyclic plate load test was carried out on a deposit of silty sand to estimate the elastic coefficient for the design of a compressor foundation. The test was carried out at a depth of 3.0 m, using 300 mm x 300 mm plate. The data obtained are:

Load intensity (t/m ²)	2.5	5.0	7.5	10	15	20	25
Elastic Settlement (mm)	0.10	0.15	0.35	0.60	1.00	1.00	1.80

Draw load vs. elastic settlement curve and determine the subgrade modulus for the plate and the coefficient of uniform elastic compression of a compressor foundation of base dimension 3.5 m x 3.5 m.

(5+6)

8. Write short notes on any THREE of the following:

(3×5)

- i) Rock Mass Rating (RMR).
- ii) Seismic refraction survey and its limitations.
- iii) Stabilisation of Boreholes
- iv) Pressuremeter Test.
- v) Sampling procedure.