Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

PECI 5411

Eighth Semester Regular Examination – 2015

GROUND IMPROVEMENT TECHNIQUE

BRANCH : CIVIL

QUESTION CODE : J 232

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any five from the rest.

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) What do you mean by hydraulic modification of ground ?

   (b) Define free swell and swell pressure.

   (c) Define critical void ratio. How does it affect the strength of the soil ?

   (d) State the most important property required for deciding the spacing of sand drains in a soft clay deposit.

   (e) How does a geo-grid differ from a geo-textile ?

   (f) Enumerate different categories of grouting.

   (g) Enumerate major uses of geo-membranes

   (h) What is land fill ?

   (i) What is the cement content requirement for different types of soils ?

   (j) What do you mean by dynamic compaction ? How does it help you in dealing with earthquake forces ?

2. How do you identify, test and modify expansive soils for construction works ? Discuss.

   A resistance of 5 blows per 300 mm was recorded from penetration test. If the moisture content of sand is 12%, what is the relative density ? 10

P.T.O.

3. Enumerate various soil stabilization techniques in brief.

A soft deposit of clay has an un-drained strength of 20 kPa. How much gravel fill (unit weight = 22 kN/m^3) can be placed on top of it without causing bearing failure (Nc = 5.8) if : 10

(i) the ground water level is at the surface ?

(ii) If there is 1 m of water above the original ground surface ?

4. Calculate the transmissivity of a geo-net using the following laboratory test data: flow rate per unit width, q = 0.72 × 10-4 m^2/sec and hydraulic gradient, i = 0.05.

Discuss the functions of geo-synthetics with neat sketches. 10

5. (a) Discuss lime stabilization in detail. 5

(b) How stone columns help soil stabilize and gain bearing capacity ? Discuss. 5

6. (a) What do you mean by grouting ? How jet grouting is different from penetration grouting ? Discuss various applications of grouting. 5

(b) How vertical drains help improve soil properties ? Briefly explain its operations and usefulness. 5

7. A 3.5 m high and 7 m wide embankment is to be built on soft ground with a basal geotextile layer. Calculate the geo-textile strength and modulus required in order to prevent block sliding on the geo-textile. Assume that the embankment material has a unit weight of 17 kN/m^3. The angle of shearing resistance is 320 and the geotextile-soil interface angle of shearing resistance is one-third of that value. 10

8. Explain any **four** of the following : 2.5×4

(a) Surface stabilizer layer

(b) Temperature degradation of geo-membranes

(c) Geo-membrane dams

(d) Vibrating plates

(e) Chemical additives

(f) Displacement grouting.