BENGAL ENGINEERING AND SCIENCE UNIVERSITY, SHIBPUR

M.E. (Civil) 1st Semester Final Examination, Dec 2013

Sub: Principles and Design of Reinforced Earth (CE 927)

Assume reasonable data if not supplied

Answer any **Five** Questions

Full Marks: **70** Time: **3 hours**

Q.1. Write short notes on: (a) Facing unit; (b) SIGMA model; (c) Friction ratio; (d) Maximum tension line; (e) Warp and weft directions.

(3+5+2+2+2=14)

Q.2. Deduce an expression, for predicting forces in reinforcing elements in case of reinforcement earth wall, by (i) Rankine theory, and (ii) Coulomb theory. Then comment on them.

(14)

Q.3. Design a 6-m-high wrap-around type of geotextile wall that is to carry a storage area of equivalent dead load of 10 kPa. The wall is to be backfilled with a granular soil (SP) having properties of $\gamma = 18$ kN/m^3, $\phi = 36^0$, and $c = 0$. A woven slit-film geotextile with warp (machine) direction ultimate wide-width tensile strength of 50 kN / m and friction angle with granular soil of $\delta = 24^0$ is intended to be used in its construction. The orientation of geotextile is perpendicular to the construction face and edges are to be overlapped or sewn to handle the weft (cross machine) direction. A factor of safety of 1.4 is to be used along site specific reduction factors. Given $RF_{ID} = 1.2$, $RF_{CR} = 2.5$, $RF_{CBD} = 1.26$, notations having their usual meanings.

(14)

Q.4. (a) Describe with neat sketches the construction details of geotextile reinforced wall.

(b) Give a brief discussion on the use of geotextile around underdrains.

(8+6 =14)

Q.5. Discuss the various factors that influence the bearing capacity of footing on reinforced soil.

(14)

Q.6 (a) Describe the test procedure for trapezoid tearing strength of geotextiles as per ASTM D 4533 with neat sketches.

(b) Explain the followings : (i) Initial tangent modulus, (ii) Offset modulus, (iii) Secant modulus, and (iv) Breaking toughness.

(6+8 = 14)

Q.7. (a) What is the significance of transmissivity ?

(b) Given the following data set for constant head cross plane flow of water through a 50 mm diameter and 0.3 mm thick geotextile calculate the permittivity and coefficient of permeability.

Δh (cm)	6.3	12.7	19.05	25.4
q (cm^3/min)	300	680	1010	1400

(c) Describe the test procedure of CBR push through test for geotextile with neat sketches.

(2+4+8=14)

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