BENGAL ENGINEERING AND SEIENCE UNIVERSITY, SHIBPUR

M.E. (Civil) 1st Semester Final Examination, Dec 2012

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. (a)Deduce that the tensile force, Ti, developed in a reinforcing element due to horizontal shear force applied at top of wall is given by $Ti = \frac{2.F_L.S_v}{h}\left[\frac{h-h_i}{h-s_v}\right]$, having the usual meaning of the notations.

(b) How does the reinforcement affect on the strength of soil? Explain with the help of Mohr-Coulomb envelope.

$(8+6=14)$

Q.2. A proposed reinforced earth retaining wall of height 8.5 m is to be constructed. A uniform surcharge of 20kN / m^2 along with a line load of 120 kN shall be applied on the top of the wall. The line load shall be applied centrally on its 1.0 m wide base, placed 1.0 m away from the facing. Galvanised mild steel, to be used as reinforcement, has its permissible stress 240 kN/ m^2. The properties of soil fill are: $\phi = 30^o$, γ = 18.0 kN / m^3. Design the wall from the consideration of local stability only.

(14)

Q.3. (a) What are the differences between the two models, viz., SIGMA model and TAU model.

(b) Describe the test procedure for measuring the apparent opening size (AOS) of geotextile.

$(6+8=14)$

Q.4. (a) Discuss the influence of the following factors on the bearing capacity of footing on reinforced soil:-

(i) Length of reinforcement layers.
(ii) Vertical spacing between two reinforcement layers;
(iii) Number of layers of reinforcement;
(iv) Friction ratio;

(b) Write short notes on " Aspect ratio".

$(3\times 4+2=14)$

Q.5. (a) Describe the test procedure of pull out test for geotextile with neat sketches.

(b) Give the following set of data from soil geotextile friction test,

Normal Stress (kPa)	18	37	56	65	97
Shear strength (kPa)	12	25	39	47	66

Calculate the fabric ratio 'f ' based on the soil friction angle 39^0

$(7+7=14)$

Contd.....

Q.6.(a) Describe the test procedure of wide width tensile test for geotextile as per ASTM D 4595 with neat sketches.

(b) In a narrow width tensile strength, the data obtained are as follows:

Elongation (%)	0	0.5	4.5	7.5	10.5	13.5	16.5
Tensile strength (kN/m)	0	0.16	0.32	0.63	1.06	1.76	2.70

Elongation (%)	19.5	22.5	25.5	28.5	33.0	36.0	39.0
Tensile strength (kN / m)	3.69	4.59	5.54	6.51	7.63	7.02	5.49

Determine (i) Initial tangent modulus, (ii) Offset modulus, (iii) Secant modulus at 5% and 10 % strain , and (iv) Breaking toughness.

(6 +8 = 14)

Q.7. (a) Differentiate between:

(i) Permittivity and Transmissivity; (ii) Woven fabric and non woven fabric.

(b) Describe with net sketches the different applications of geotextiles used adjacent to the soil for the purpose of filtration.

(4 +10 = 14)

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