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MID SEMESTER EXAMINATION-2015

B.Tech. VIII Semester

COURSE CODE: 14B1WCE831 MAX. MARKS: 30

COURSE NAME: Geotextiles

COURSE CREDITS: 3 MAX. TIME: 2 HRS

Note: *All questions are compulsory.*

Assume data wherever necessary.

Section A **(Marks: 1x6 = 6)**

Answer the following:

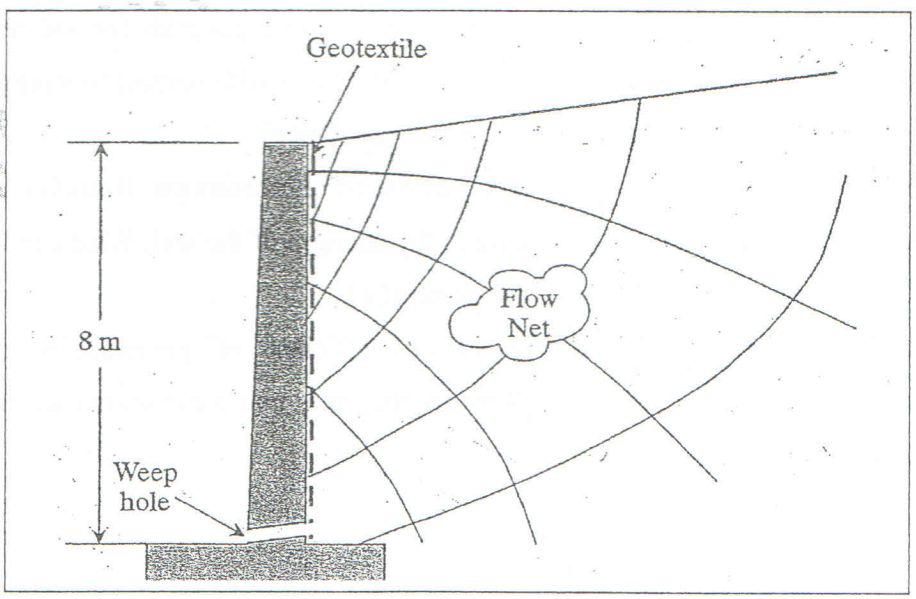
1. Can one use a geomembrane as a separator instead of a geotextile beneath a road? Give reason for your answer.
2. A geotextile of thickness 1.0 mm and mass per unit area 500 gsm is recommended for use at a site. It is not available in the local and nearby market. Instead a lower grade material of the same type but having a thickness of 0.5mm and mass per unit area of 250 gsm is available. Can one use two layers of the latter geosynthetics, placed one above the other as a substitute for the recommended geotextile?
3. State the reason why the response curve for the long term flow test is initially piecewise linear. What does the (–)ve, (+)ve and zero slope of the response curve indicate?
4. What are the advantages and disadvantages of using geogrids for soil reinforcement in comparison to steel strips for reinforced earth walls with respect to strength, elongation, ease in transportation, laying and chemical resistance?
5. Geotextile was placed in soil for the purpose of reinforcement. However from lab tests it was found that there was no increase in the strength of the soil. What can be the probable reason for the ineffectiveness of the geotextile?
6. Can two geotextiles have the same coefficient of permeability but differently transmissivity and permittivity? Why are the latter two parameters used in preference to the former for geosynthetics?

Section B (Marks: 3x3= 9)

1. For a 12m high zoned embankment, the seepage estimated using flow nets 12.5 x 10^{-7} m^2/sec – m for k of 5 x 10^{-8} m^2/sec – m for the core. It is proposed to provide a non – woven geotextile to act as a filter between the shell and the core. The geotextile is a 10mm thick, 2000 gsm geosynthetic with an allowable permittivity of 0.05sec^{-1} and of 0.004mm. The soil of the core is clayey silt with D_{85} of 0.03 mm. Will the geosynthetic be satisfactory as a filter? [3]
2. Concerning clogging of the geotextile in the field:
    a. What are the main soils and conditions where excessive clogging of geotextiles is likely to occur?
    b. In such instances, what is the logical recommendation? [1.5 + 1.5 = 3]
3. Describe the basic functioning of the weaving loom used for manufacture of woven geotextiles along with the diagram. Also explain the nomenclature used for woven textiles. [3]

Section C (Marks: 5x3 = 15)

1. Calculate the factor of safety of a 500 g/m^2 needle – punched, non – woven geotextile required to drain water from behind an 8m high concrete cantilever retaining wall if it has an allowable transmissivity of θ_{allow} = 0.15 x 10^{-3} m^2/min measured at its maximum design pressure. The soil backfill is a silty sand (ML - SW) with k = 5 x 10^{-5} m/sec. The retaining wall makes an angle of 90° with its base. [5]



2. You have been given the following set of data from a soil- geotextile friction test. Use **GRAPH** paper to: [1+2+2 = 5]

Normal Stress (kPa)	Shear Strength (kPa)
17	8.6
35	20
70	36
140	75

a. Plot the Mohr failure envelope

b. Obtain the friction angle

c. Calculate the fabric efficiency based on a soil friction angle of 38°.

3. Regarding geotextiles in separation: [2.5 + 2.5 = 5]

a. What is the required burst pressure of a geotextile supporting a 75 mm maximum size stone and heavy trucks with a tire inflation pressure of 1000 kPa? Use $p = 0.75p_a$, a cumulative reduction factor of 2.0 and a factor of safety of 2.0.

b. What is the required burst pressure of a geotextile under the same condition in part (a) except that now the road will haul only light vehicles of tire inflation pressure of 500 kPa.

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