

มหาวิทยาลัยสงขลานครินทร์
คณะวิศวกรรมศาสตร์

การสอบกลางภาค ประจำปีภาคการศึกษาที่ 2
สอบวันที่ 22 ธันวาคม 2549
วิชา 220-527 Geosynthetics Engineering

ปีการศึกษา 2549
เวลา 09.00-12.00 น.
ห้องสอบ R200

ข้อกำหนด:

1. ข้อสอบ มี 4 ข้อ คะแนนเต็ม 30 คะแนน ให้ทำทุกข้อ
2. ให้นำสมุด Lecture, Sheet และ หนังสือ เข้าห้องสอบได้
3. ให้นำเครื่องคิดเลขทุกชนิดเข้าห้องสอบได้

ออกข้อสอบโดย
ดร. พิพัฒน์ ทองนิม
14 ธันวาคม 2549

1. Given : - CBR of subgrade = 1 %

- 1000 passages of an 80-kN axle-load vehicle
- Tire inflation pressure, $p_a = 480$ kPa
- Geotextile modulus, $E = 300$ kN/m
- Allowable rut depth, $r = 0.30$ m.
- Maximum size aggregate = 2.0 in.
- Ultimate burst strength = 285 lb./in.^2
- Allowable grab tensile strength = 50 lb
- Allowable impact strength = 2.0 ft-lb
- Height of free fall = 8 ft.
- Partial factors of safety = 2.5

Determine:

- 1.1 Global factor of safety of a burst resistant, a grab tensile strength and an impact resistant. (assume $p' = 0.75p_a \text{ lb./in.}^2$, $f(\in) = 0.52$) (6 points)
- 1.2 Aggregate thickness of an unpaved road (without geotextile) (2 points)
- 1.3 Aggregate thickness of an unpaved road (with geotextile) (2 points)

2. A flow rate of runoff is $6.00 \text{ in.}^3/\text{sec-in.}$ containing sediment as small as 0.002 in. The ground slope is 15° in the vicinity of the silt fence. The geotextile being considered has a thickness of 25 mils, a coefficient of permeability of 0.015 in./sec. , a threshold pressure head of 6.0 in. , a wide-width allowable tensile strength of 120 lb./in. , allowable modulus of 1000 lb./in. $K = 0.4$ and $\gamma_s = 110 \text{ lb/ft.}^3$

Determine :

- 2.1 The require height of silt fence (2 points)
 - 2.2 The factor of safety of the geotextile without fence support (i.e., posts only 6 ft. center to center) (2 points)
 - 2.3 The factor of safety of the geotextile with fence support between posts having a mesh 6 in. width by 6 in. height. (2 points)
3. A 100 ft. width surcharge fill placed in 20 days on a 10 ft. thick layer (double drainage) of saturated clay under surcharge loading underwent 90 % primary consolidation in 75 days. Give a permeability of soil = $1.2 \times 10^{-5} \text{ ft/hr.}$, $T_{90} = 0.848$ and allowable transmissivity of geotextile, $\theta_{\text{allow}} = 0.011 \text{ ft.}^3/\text{min.-ft.}$

Determine:

- 3.1 The required geotextile transmissivity (2 points)
- 3.2 Global factor of safety (2 points)

4. Using the approach indicated by Figure 3.13 and 3.14 ($r_u=0.25$) in Koerner 's Book (1994). , determine the number, spacing, and length of the UX 1300 geogrids needed to stabilize the following embankment using a global FS = 2.0. Use a combined partial factor of safety of 3.0 on the value listed in Table 3.2 to arrive at allowable geogrid strength. (10 points)

