Registration no: | | | | | | | | | | |

M .TECH
GEPE205

2nd SEMESTER BACK EXAMINATION – 2016-17
RAINFORCED SOIL STRUCTURES
BRANCH(S): GEOTECHNICAL ENGG
Time: 3 Hours
Max Marks: 70
Q.CODE: Z843
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
Assume Suitable Data Wherever Necessary

Q1   **Answer the following questions:**   **(2 x 10)**
  a) What are the prime modes of geosynthetic failure in a slope stabilization application?
  b) Can you recommend fine grained soils as backfill material? Why?
  c) Discuss the basic functions that geosynthetics perform?

  d) How these geosynthetics act as a reinforcement to the soil?
  e) Draw the stress-strain curve of geotextile showing its max. tensile strength?
  f) State two major differences between Permittivity and Transmissivity?
  g) What is an Index test?
  h) Draw the cross-section of a Tunnel vault showing the general arrangement of the lining system?
  i) What are the different physical properties of a Geomembrane?
  j) What is the expression for bearing capacity ratio in context to reinforced earth systems?

Q2   Discuss the various exsisting short-term and long-term erosion control systems?   **(10)**

Q3   List the parameters affecting the load-bearing capacity of a geosynthetic-reinforced foundation soils. Describe the effects of the most significant parameters?   **(10)**

                                                                            (10)
Q4 a) State and explain various geotechnical applications of geomembranes?
  b) Calculate the Transmissivity of a geonet using the following laboratory based data:
  Flow rate per unit width, q=0.72x10⁻⁴ m²/s
  Hydraullic gradient, i=0.05

Q5 Consider a 6m high geogrid reinforced retaining wall with a horizontal backfill. The reinforced earth wall will be part of a national highway in zone-IV. Find the length of the reinforcement required to make the wall safe against sliding, overturning, bearing and seismic forces. The properties of the fill and the loads acting on the wall are as follows: **(10)**
For reinforced earth fill:
$\emptyset_r$=35°
Y_r=20 kN/m^3
For backfill:
$\emptyset_b$=30°
Y_b=18kN/m^3
Surcharge:
q_d=15kPa
q_L=25kPa
bearing capacity, q_{na}=200kPa
Coverage ratio=1
$S_{a/g}$=1.0
Importance factor=1.5
Zone factor=0.24
Response reduction factor=3
Assume any missing data & state clearly in the answer script.

Q6 a) In a laboratory constant head cross-plane permeability test was on a 50mm dia. geotextile specimen.The following parameters were measured **(5)**
Nominal thickness, Δx=2.1 mm
Flow rate of water normal to the plane of the geotextile, Q_n=0.317 l/s
Head loss across the geotextile, Δh=300mm
Calculate the permittivity and cross plane coeff. Of permeability of the geotextile?

b) Describe the basic similarities and differences between geotextiles and geogrids? **(5)**

Q7 a) What are the different mechanisms for soil reinforcement? Explain? **(5)**
b) How will you make stability checks for geomembrane-lined slopes? **(5)**

Q8 **Write Short Notes (Any Two)** **(5 x 2)**
a) Bearing capacity of geotextiles
b) Anchorage strength of geogrids
c) Fluid barrier
d) Geofoam