

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014****Subject code: 1724303****Date: 04-12-2014****Subject Name: Geosynthetics and Reinforced Earth****Time: 02:30 pm - 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Enumerate the various types of geogrid, functions of geogrid and explain reinforcement function in detail with neat sketch. **07**
- (b) Enlist the various factors required to be considered in the design of RE wall and explain the functionality of each with neat sketch. Support your answer with composite pressure and surcharge profile. **07**

- Q.2** (a) Write brief note on selection of various geosynthetics for various functions giving justifications. **07**
- (b) What are the performance characteristics of geosynthetics other than their basic functions? How do they differ from the basic functions? **07**

OR

- (b) Write detail note on use of geosynthetics in embankment. **07**
- Q.3** (a) Differentiate between transmissivity and permittivity **07**
- In laboratory constant head in plane permeability test on a 300mm length (flow direction) by a 200 width geotextile specimen, the following parameters were measured.

-Nominal thickness $\mu x = 2$ mm-Flow rate of water in the plane of the geotextile $Q_p = 52$ cm³/min-Head loss in the plane of the geotextile $\mu h = 200$ mm

Calculate the transmissivity and in plane co-efficient of permeability of the geotextile.

- (b) Explain in detail geotechnical application of geomembrane. **07**

OR

- Q.3** (a) Discuss the cross-section of a typical flexible pavement. Illustrate how different geosynthetics can be used for improving the performance of these pavements. **07**

- (b) What do you mean by MSW landfills lining? Write advantage of geomembranes over clay liner. **07**

- Q.4** (a) Draw and explain in detail the flow chart of design procedure for reinforced soil walls using anchored earth method with all stability checks. Support your answer with necessary equations. **07**

- (b) A geotextile reinforced retaining wall is 7m high. For the granular backfill, given: $\gamma_s = 15.9$ kN/m³ and $\phi_1 = 31^\circ$. Given, for the geotextile: $\gamma_G = 18$ kN/m. For the design of the wall, determine S_v , L and l_1 . Use $FS_{(B)} = FS_{(P)} = 1.6$. **07**

OR

- Q.4** (a) What is the importance of external stability in design of RE wall as per BS8006? How it is evaluated? Support your answer with necessary equations. **07**

- (b) Explain the concept of reinforced earth wall with neat sketch. How it differs from unreinforced earth? State and explain the limit state principles adopted in RE wall. Justify the importance of each with suitable example. 07

Q.5 Attempt the following: 14

- (i) Sketch the various types of reinforced earth walls and various facing panels used in practice.
- (ii) Consider a section of a retaining wall with a reinforced backfill and having surcharge of intensity (q_0) = 42 kN/m² of 1m length and located at 1m from facing unit. Determine the reinforcement distribution, maximum tension in the strip and check for external stability. Take Height of wall = 6m, width of strips = 100mm, thickness of strips = 6mm, $f_s = 145$ MPa, $c = 0$, $\phi = 34^\circ$, $\gamma = 17.6$ kN/m³, $h \times s = 0.5\text{m} \times 0.5\text{m}$. Consider first strip at 0.25 depth from top.

OR

Q.5 Answer only in three-four lines with proper reasons/justifications: 14

(any 7)

- i. In case of cohesive soil the pull out is governed by which factor?
- ii. What is the change in Mohr's circle before and after provision of reinforcement in the soil?
- iii. Which are the internal and external environmental factors which effect reinforcement geometry?
- iv. What are the limitations of flexible reinforcement elements?
- v. On which property does the effectiveness of soil reinforcement interaction depends?
- vi. Explain the reason of reduction in axial compressive strain and lateral strain.
- vii. What is active zone in design of RE wall and which type of length is provided in active zone? Why length is extended to resistant zone?
- viii. What do you mean by durability and performance of RE wall with time?

