

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2013****Subject code: 1724303****Date: 03-06-2013****Subject Name: Geosynthetics and Reinforced Earth****Time: 10.30 am – 01.00 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) Explain various geotextile functions and mechanisms in detail. Name the various tests for which the geotextiles are examined? **07**
- (b) Explain the external stability of RE wall as per BS8006. Also show bearing and tilt failure and sliding along the base. **07**

- Q.2** Attempt the following: **14**
- (i) State the types of reinforced earth walls as per BS8006. Describe the conditions under which they are adopted. Give limitations of each.
- (ii) Consider a section of a retaining wall with a reinforced backfill and having surcharge of intensity (q_o) = 30 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 = 4.5m, width of strips = 100mm, thickness of strips = 5mm, $f_a = 143.7$ MPa, $c = 0$, $\phi = 36^\circ$, $\gamma = 17.5$ 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.2** Figure.1 shows section of a retaining wall with geotextile reinforcement. The wall is backfilled with granular soil having $\phi = 36^\circ$, $\gamma = 19.12$ kN/m³. A woven slit-film geotextile with warp direction ultimate wide-width strength of 70kN/m and having $\phi = 26^\circ$ is intended to be used in its construction. The orientation of the geotextile is perpendicular to the wall face and the edges are to be overlapped to handle the weft direction. A factor of safety of 1.5 is to be used along with site specific reduction factors. Determine (i) spacing of the individual layers of geotextile (ii) length of fabric layers (iii) check for overlap (iv) check for external stability. The backfill carries a uniform surcharge dead load of 8kN/m². Assume $C_r = 0.8$ and $C_i = 0.75$. **14**

- Q.3** (a) Explain in detail geotechnical application of geomembranes. **14**

OR

- Q.3** (a) Enlist and explain various properties and test methods for geogrids. **07**
- (b) What do you mean by MSW landfills lining? Write advantage of geomembranes over clay liner. **07**

- Q.4** Answer in three-four lines with proper reasons/justifications: **14**
- (i) Which type of backfill material should be adopted in case of RE wall and why?
 - (ii) Give spacing criteria specified for strip reinforcements as per BS8006. What do you mean by no tension line in case of RE wall design?
 - (iii) What is the disadvantage of strip reinforcement and why?
 - (iv) What is a limitation of polymeric reinforcements in RE wall?
 - (v) As per BS8006 which environmental considerations are considered in design of RE wall?

OR

- Q.4 (a)** What do you mean by internal stability? Give detail design procedure along with flowchart for reinforced soil walls using anchored earth method and Tie back wedge method as per BS8006. **07**
- Q.4 (b)** Explain how reinforcement is used to control embankment stability resting on soft soils. State various limit states considered for embankment stability and define with neat sketch rotational stability. **07**

- Q.5** Explain in detail various functions of geotextile, requirement and relevant properties of geotextile in tubular form. Also discuss the future scenario of application of geotextiles in India. **14**

OR

- Q.5** Explain in detail with neat sketches the use of geosynthetics in following civil engineering projects/works. **14**
- (i) Railway work
 - (ii) Earthen dam construction
 - (iii) Erosion control
 - (iv) Canal lining

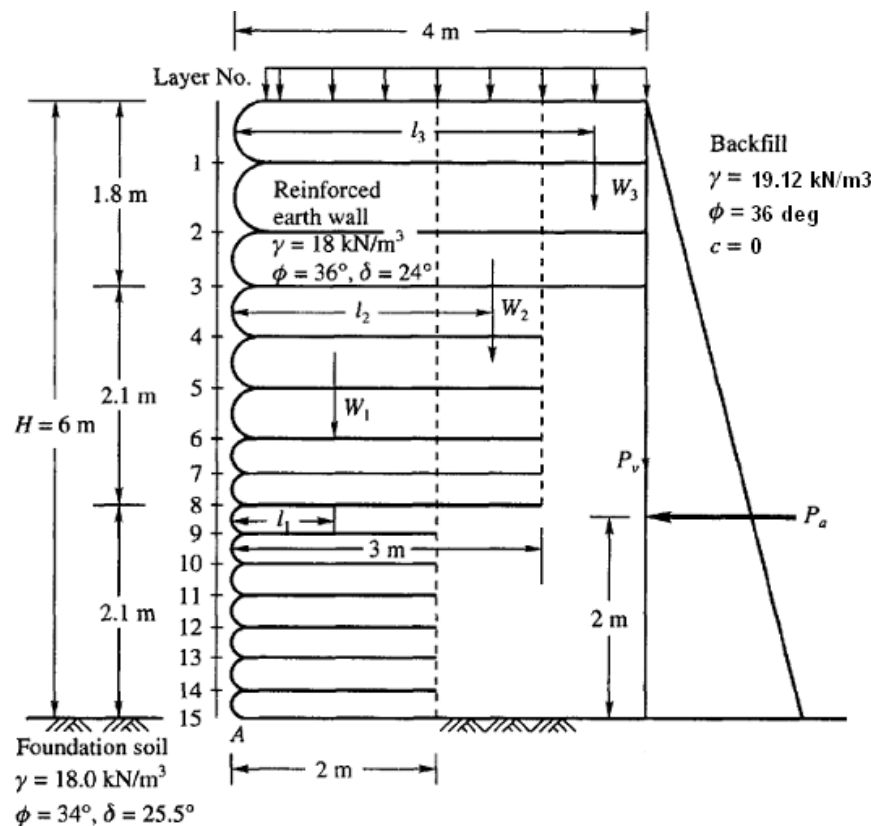


Figure .1