

EIGHTH SEMESTER B.TECH. (CIVIL)
ELECTIVE 08.807.10: REINFORCED EARTH

Time: 3 hours

Max. Marks: 100

Answer all questions from the Part A and any one question each from each module from the Part B. All questions in Part A carry equal marks.

Part A.

1. Briefly explain the various functions performed by geosynthetics.
2. Briefly describe the mechanism of mobilization of reinforcement strength in the case of (i) Geogrid (ii) Geotextile (iii) Metallic Strips
3. List the various processes by which (i) non-woven geosynthetics and (ii) geogrids are manufactured.
4. List the major raw materials that are used for the manufacture of soil reinforcements.
5. What are the possible modes of failure of a soil-reinforcement system?
6. List the assumptions made by Binqet and Lee in their analysis of reinforced earth beds.
7. List the assumptions involved in the Tie Back Wedge analysis.
8. Discuss the corrosion of steel meshes vis-à-vis degradation of polymeric reinforcements in reinforced soil structures.

Part B

MODLUE I

9. The following data refers to a reinforced soil structure with strip reinforcement. $\Delta V = 4\text{cm}$, $\Delta H = 10\text{ cm}$, $\gamma = 20\text{ kN/m}^3$, Max. permissible stress in the reinforcement = 10^5 kPa , $\phi_i = 32^\circ$, $w = 3\text{cm}$, $L = 75\text{ cm}$, $t = 0.2\text{cm}$. Find the equivalent confining stress. What type of failure is expected in the structure. Find the equivalent confining stress if geotextile reinforcement with a stiffness of 1500 kN/m is used instead with a vertical spacing of 8cm . What will be the mode of failure in this case? (20)

10. List (i) Physical properties (ii) Mechanical properties (iii) Hydraulic properties (iv) Constructability/ survivability properties and (v) Durability properties with respect to geosynthetics. What is the significance of thickness as a property? (20)

MODULE II

11. Explain with sketches the various modes of stability of retaining walls. (20)
12. A reinforced soil retaining wall is to retain 6m high soil ($\phi = 36^\circ$, $\gamma = 16\text{kN/m}^3$ for the reinforced soil fill, foundation and the back fill). The allowable bearing pressure on the foundation is 300 kPa . Surface of the backfill is horizontal and is subjected to a uniform surcharge pressure of 24 kPa . Geogrid reinforcement with a tensile strength of 110 kN/m shall be used. Design the reinforced soil wall. Take an interaction factor of 0.6 . (20)

MODLUE III

12. Explain concertina method and telescopic method of construction of reinforced soil retaining walls with sketches. (20)
13. What are natural geosynthetics? What are their advantages? Explain the typical situations where natural geosynthetics can be employed. (20)