

Seventh Semester B.E. Degree Examination, June/July 2023

Reinforced Earth Structures

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define 'Reinforced Earth'. Discuss in brief, the historical development of RE as applied to civil engineering. (10 Marks)
- b. Enumerate the principle of RE using 'Effective confining stress' concept. Derive relevant expressions for the same. (10 Marks)

OR

- 2 a. What are the functions of Geo-synthetics in reinforced soil structures? (08 Marks)
- b. Distinguish Geo-grids and Geo-membranes. (06 Marks)
- c. Discuss the following tests used for geo-synthetics. (06 Marks)
 - i) Trapezoidal tear strength test
 - ii) Burst test.

Module-2

- 3 a. Discuss the external and internal stability as applied to RE retaining wall. (10 Marks)
- b. A 6m high retaining wall has reinforcing mats placed at 0.5m vertical spacing. Details of surcharge load and soil properties are shown in Fig. Q3(b) check the external stability of wall given that maximum FS = 1.5. Also determine FS against tension failure for the bottom most reinforcement if it is placed 0.25m above the bottom and yield strength for the mat reinforcement is 50kN/m. Take bearing capacity of soil as 250kN/m²A.

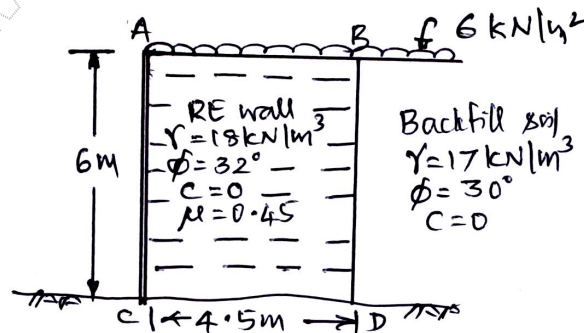


Fig.Q3(b)

(10 Marks)

OR

- 4 a. Discuss briefly the components of soil nailing. Enumerate the required properties of soil for soil nailing. (10 Marks)
- b. Explain the step-by-step procedure of soil nailing technique. (10 Marks)

Module-3

- 5 a. Define 'Bearing Capacity Ratio(BCR)'. Derive an expression for the force developed in the reinforced soil bed, if it fails by tension rupture for strip footing. (10 Marks)
- b. With a neat sketch, discuss the mode of failure of a foundation resting on reinforced earth in the terms of variations in number of layers of reinforcement. (10 Marks)

OR

- 6 a. List the assumptions and mechanism involved in assessment of b.c. of strip foundation on reinforced earth. (10 Marks)
 b. Explain the mechanism of improving b.c. of soils using RE in terms of : shear layer effect, confinement effect and additional (10 Marks)

Module-4

- 7 a. Discuss in brief 'Giroud Norway approach' for designing RE unpaved roads. (12 Marks)
 b. Enlist the functions of geo-synthetics in road ways. (08 Marks)

OR

- 8 a. Write an explanatory note on reinforced soil embankment and its stability analysis. (08 Marks)
 b. The following design example is related to proposed site geometry and site/soil properties are shown in Fig.Q8(b). Recommend the required reinforcement details given $K = 0.18$ and $\frac{L}{H} = 1$.

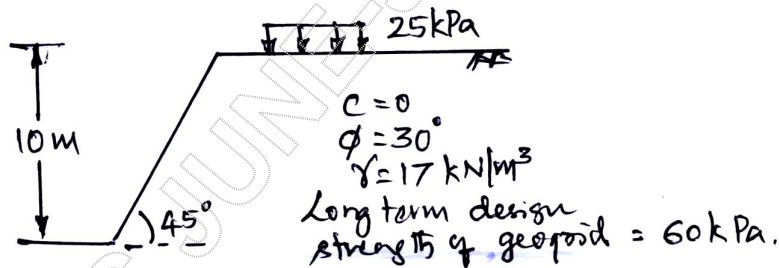


Fig.Q8(b)

(12 Marks)

Module-5

- 9 a. What are the functional requirements of geo-textile filters? (12 Marks)
 b. Explain briefly geo-synthetic clay lines. (08 Marks)

OR

- 10 a. What are "Landfills"? With neat sketches, explain different types of categories of landfills. (12 Marks)
 b. Discuss in brief the leachate collections and removal system in landfills. (08 Marks)
