

GEO-SYNTHETICS AND REINFORCED SOIL

Paper Code: ETCE-415

Paper: Geo-synthetics and Reinforced Soil

L	T/P	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

***Objective:** To introduce the students to the different types of geosynthetics, their manufacturing technique, testing methods and their applications in different types of Civil Engineering projects.*

UNIT - I

Introduction: Historical background of reinforced soil, Principles of reinforced soil through Mohr circle analysis.

Different types of geosynthetics: Types of geosynthetics like geotextiles, geogrids, geonets, geocells, geo-composites, their manufacturing methods.

Testing methods for geosynthetics: Techniques for testing of different index properties, strength properties, Apparent Opening Size, In-plane and cross-plane permeability tests.

[T1,T2][No. of Hrs: 12]

UNIT - II

Reinforced Soil retaining walls: Different types of walls like wrap-around walls, full-height panel walls, discrete-facing panel walls, modular block walls Design methods as per BS-8006 and FHWA methods Construction methods for reinforced soil retaining walls.

Reinforced soil slopes: Different slope stability analysis methods like planar wedge method, bi-linear wedge method, circular slip methods, Erosion control on slopes using geosynthetics.

[T1][No. of Hrs: 12]

UNIT - III

Applications in foundations: Binquet and Lee's approach for analysis of foundations with reinforcement layers.

Drainage and filtration applications of geosynthetics: Different filtration requirements, filtration in different types of soils and criteria for selection of geotextiles.

[T2][No. of Hrs: 10]

UNIT - IV

Pavement application: Geosynthetics for separation and reinforcement in flexible pavements, design by Giroud-Noiray approach, reflection cracking and control using geosynthetics.

Construction of landfills using geosynthetics: Different components of modern landfills, collection techniques for leachate, application of different geosynthetics like geonets, geotextiles for drainage in landfills, use of geomembranes and Geosynthetic Clay Liner [GCL] as barriers.

[T1,T2][No. of Hrs: 11]

Text Books:

[T1] Koerner, R.M. "Designing with Geosynthetics", Prentice Hall, New Jersey, USA, 4th edition.

[T2] Jewell, R.A., "Soil Reinforcement with Geotextiles", Special Publication No. 123, CIRIA, Thomas Telford. London, UK, 1996.

References

[R1] Geosynthetics - New Horizons, Eds. G.V. Rao, PK Banerjee, J.T. Shahu, G.V. Ramana, Asian Books Private Ltd., New Delhi, 2004.

[R2] Reinforced Soil Engineering: Advances in Research and Practice, Hoe I. Ling, Dov Leshchinsky Fumio 2003-Tatsuoka.

[R3] Design and Practice of Geosynthetic-Reinforced Soil Structures, Hoe I. Ling, Guido Gottardi Daniele, 2013-Cazzuffi

[R4] Geosynthetics and Their Applications, Sanjay Kumar Shukla – 2002

[R5] Geosynthetics Asia 1997: Select papers, C.V.J. Varma, Venkatappa Rao, G 1998-Rao, G.R.A