

GEOSYNTHETICS AND REINFORCED SOIL STRUCTURE

Offering branch: CE			
Course Category:	Honours	Credits:	4
Course Type:	Theory	Lecture-Tutorial-Practical:	3-1-0
Prerequisites:	20CE3402- Geotechnical Engineering 20CE4703B - Ground improvement techniques	Continuous Evaluation:	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Explain how the polymeric composite manufactured, and what factors were used to increase the tensile strength	K3
CO2	Analyze the hydraulic and mechanical characteristics of polymeric composites	K4
CO3	Explain the engineering use of polymeric composite in the context of soil-structure interaction	K2
CO4	Design retaining structures/slopes/cuts using soil nailing technique.	K6
CO5	Explain the concepts of using Geosynthetics as filter, drainage and materials and design landfill as per standard guidelines.	K4

Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2		2	2	2				2	2	2
CO2	2	2	2	2		3	3	3				3	2	3
CO3	3	3	3	3		2	2	2				2	3	2
CO4	2	2	2	2		3	3	3				3	2	3
CO5	2	2	2	2		3	3	3				3	2	3
Avg.	2	2	2	2		3	3	3				3	2	3

1- Low

2-Medium

3-High

Course Content

UNIT-1	<p>Introduction: Definition, Historical Background, Advantages and Disadvantage of reinforced earth Construction.</p> <p>Formation of geosynthetic composite: Chemical synthesis, Physical properties, viscosity of polymer, Raw materials–polypropylene (polyolefin), Polyethylene (Polyoefin), Polyester, Polyvinyl chloride, Classification based on materials type– Metallic and Non-metallic, Natural and synthetic materials.</p>	CO1
UNIT-2	<p>Hydraulic and Mechanical Properties: Physical, Chemical, Mechanical, Hydraulic, Endurance and Degradation requirements, Testing & Evaluation of properties</p>	CO2
UNIT-3	<p>Design of reinforced earth foundations and embankments: Foundations – Modes of failure of foundation, Determination of force induced in reinforcement ties–Location of failure surface, tension failure and pull out resistance</p> <p>Embankments– Concept of Reinforced Embankments, Internal and external stability, Selection of materials, typical design problems, slope stability related problem</p>	CO3
UNIT-4	<p>Soil nailing techniques: Concept, Advantages & limitations of soil nailing techniques, comparison of soil nailing with reinforced soil, methods of soil nailing, Construction sequence, Components of system, Design aspects, Precautions to be taken in the applications of soil nailing techniques.</p>	CO4
UNIT-5	<p>Filter, drain and landfills: Filter & Drain– Conventional granular filter design criteria, Geosynthetic filter design requirements, Drain and filter properties, Design criteria – soil retention, Geosynthetic permeability, anticlogging, survivability and durability, Landfills–Typical design of Landfills, Landfill liner & cover, EPA Guidelines,</p>	CO5

Learning Resources

Text Books	<ol style="list-style-type: none"> Swami Saran, Reinforced soil and its Engineering Applications, I.K. International Pvt. Ltd., 2005. Edition 2nd 2010. Shiva Kumar Babu G L, An Introduction to Soil Reinforcement and geosynthetics – Universities Press, 2005.
Reference	<ol style="list-style-type: none"> Jones CJEP, Earth reinforcement and Soil structure, Butterworths, 1996 London,

Books	1996 2. Hidetoshi Octial, Shigenori Hayshi & Jen Otani, Earth Reinforcement Practices, Vol. I, A.A. Balkema, Rotterdam, 1992. 3. Ingold, T.S., Reinforced Earth, Thomas, Telford, London. 4. Koerner. R.M., Design with geosynthetics, 4th Edition, Prince Hall Publication, 1994. Edition 6th 2012.
e-Resources & other digital material	https://nptel.ac.in/courses/105106055/