

Geotechnical Engineering
Earth Retaining Structure
01GT0209 (PEC)
Objective of the Course:

1. To impart knowledge of various earth retaining structures
2. To analyses and design rigid, flexible earth retaining structures

Credit Earned: 3
Students learning outcomes:

After successful completion of the course, it is expected that student will be able to,

1. Understand the earth pressure development mechanism and use of available theories
2. Understand basic mechanism of reinforced earth wall and able to design RE wall.
3. Analyze and design various rigid and flexible retaining structures
4. Analyze types of excavation, Design excavation on both in sands and clays

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	CSE (I)	IA (M)	Viva (V)	Term Work (TW)	
03	00	00	03	50	20	30	25	25	150

Detailed Syllabus

Sr. No.	Title of the unit	Number of hours
1	Earth Pressure Theories	9
	Introduction – State of stress in retained soil mass – Earth pressure theories – Classical and graphical techniques – Active and passive cases – Earth pressure due to external loads, empirical methods. Wall movement and complex geometry.	
2	Design Reinforced earth retaining wall	12
	Reinforced earth retaining wall – principles, Concepts and mechanism of reinforced Earth – Design consideration of reinforced earth – Materials used in reinforced earth - Geotextile – Geogrids, Metal strips, facing elements.	
3	Sheet Pile Wall	12
	Analysis of cantilevered and anchored sheet pile walls in granular & cohesive soils-fixed and free earth system	
4	Braced excavation	

Geotechnical Engineering

	Types; construction methods; pressure distribution in sands and clays; stability -bottom heave, seepage, ground deformation	9
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Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	5%	20%	25%	25%	20%

Instructional Method and Pedagogy:

1. Use of Learning Management system like canvas
2. Demonstration through presentations on power point and videos and lectures
3. Brainstorming and group discussion sessions
4. Collaborative learning

Recommended Study Material:
Reference Book:

1. Randolph Das, BrajaM; Principles of Foundation Engineering;Cengage Learning.
2. Bowles. J.E (1997);Foundation Analysis and Design;McGraw-Hill International Edition, 5thEdn.
3. Donald P Coduto ; Foundation Design Principles and Practices; 2nd edition, Pearson India
4. Chris R.I. Clayton, Rick I. Woods, Andrew J. Bond, Jarbas Milititsky (2014); EarthPressureand Earth-Retaining Structures;CRC Press
5. Koerner, R.M. (2012); Designing with Geosynthetics; 6 thedition, 1and2,Xlibriscorp.ion
6. G.V. Rao, PK Banerjee, J.T. Shahu, G.V.Ramana (2004); Geosynthetics -New Horizons;Eds. Asian Books Private Ltd., New Delhi.
7. Milititsky.J and Woods.R, "Earth and Earth retaining structures", Routledge, 1992
8. Clayton.C.R.I, Milititsky, J. and Woods, R.I., "Earth pressure and Earth-Retaining structures" (Second Edition), Survey University Press, 1993.
9. Mandal.J.N, "Reinforced Soil and Geotextiles", Oxford &IBH Publishing Co. Pvt. Ltd., New Delhi.