Marwadi University

Syllabus for Master of Technology

Geotechnical Engineering

Critical Soil Mechanics
01GT0109 (PEC)

Objective of the Course: Objectives of introducing this subject at first year level in Masters of civil engineering are:

1. Decide the type of mathematical models to be used for analyzing the behavior of the soil mass at critical state.

Credits Earned: 3

Students learning outcomes:

After the successful completion of the course student will be able to..

1. Understand the behavior of soil in critical state
2. Predict the behavior of over-consolidated soil.
3. Understand the behavior of Sands in critical state.
4. Develop the elastic-plastic model based on critical soil state.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	CSE (M)	Internal (I)	Viva (V)	Term Work (TW)	
3	0	0	3	50	20	30	25	25	150

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Detailed Syllabus

Sr No.	Title of the unit	Number of hours
1	**Soil Behaviour in Critical state**	14
	State of stress and strain in soils, Stress and strain paths and invariants, behavior of soils under different laboratory experiments. The Critical state line and the Roscoe surface: Families of undrained tests, Families of drained tests, the critical state line, drained and undrained surfaces, The Roscoe surface	
2	**Behavior of Overconsolidated samples**	12
	The Hvorslev surface: Behaviour of overconsolidated samples, drained and undrained tests, The Hvorslev surface, complete State Boundary Surface, Volume changes and pore water pressure changes	
3	**Behavior of Sands**	14
	The critical state line for sands, Normalized plots, the effect of dilation, Consequences of Taylor's model	
4	**Behavior of soils before failure**	16
	Elastic and plastic deformations, Plasticity theory, Development of elastic-plastic model based on critical state soil mechanics, The Cam-clay model, The modified Cam-clay model	

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%	10%	25%	25%	20%	15%

Instructional Method and Pedagogy:

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

Recommended Study Material:

Reference Books:

1. J. H. Atkinson and P. L. Bransby, "The mechanics of soils: An introduction to critical state soil mechanics", McGraw Hill, 1978Ground Engineering - The Institute of Civil Engineers, London, 1970.
2. D. M. Wood, "Soil behaviour and critical state soil mechanics", Cambridge University Press, 1990.
3. B. M. Das, "Fundamental of geotechnical engineering", Cengage Learning, 2013

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