Marwadi University

Syllabus for Master of Technology

Structural Engineering

Advanced Design of Foundation

01ST1211 (PEC)

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

- Gain knowledge of about advanced topics of foundation design and analyses, supplementing their comprehensive knowledge acquired in basic foundation engineering course.
- Develop understanding of choice of foundation design parameters.
- Learn about cause and effect of dynamic loads on foundation.

Credit Earned: 3

Students learning outcomes:

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

1. Estimate the size of isolated and combined foundations to satisfy bearing capacity and settlement criteria.
2. Determine the load carrying capacity and settlement of single piles and pile groups.
3. State analysis and design principles of well foundation, drilled piers and caissons.
4. Apply principles for analysis and design of machine foundations.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	CSE (I)	Internal (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	**Subsurface exploration**	**04**
	Boring, Sampling, SPT, CPT, Geophysical methods, Bore log and soil report.	
2	**Shallow Foundations, Design of Combined and Raft foundations**	**12**
	Terzaghi's, Meyerhoff, Hansens bearing capacity theories, based on SPT, layered soils, eccentric and inclined loads. Bearing capacity on slopes, Foundation settlements, Design of combined footings by Conventional and elastic line methods	

3	**Design of Retaining walls, Sheet Pile Walls, Braced Cuts**	**08**
	Lateral earth pressure, Retaining wall stability, Cantilever and Anchored sheet pile walls, Pressure envelopes and design of various components	
4	**Pile Foundations**	**08**
	Load transfer mechanism, Pile capacity in various soil types, negative skin friction, group action, settlements, laterally loaded vertical piles	
4	**Machine Foundations**	**10**
	Free and forced vibration with and without damping, Elastic half space for rigid footings. Vibration analysis of foundations subjected to vertical, sliding and rocking modes, Design criteria for machine foundations	

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 ppt and videos and lectures
3. Brainstorming and group discussion sessions
4. Collaborative learning

Recommended Study Material:

Reference Book:

1. Bowles J.E., Foundation Analysis and Design, McGraw Hill Pub. Co. New York.
2. Swami Saran, Analysis and Design of Substructures, Oxford & IBH Pub. Co. Pvt. Ltd., India
3. R.B. Peck, W.E. Hanson & T.H. Thornburn, Foundation Engineering, Wiley Eastern Ltd., India
4. Braja, M. Das, Principles of Geotechnical Engineering, Cengage Learning, India
5. Bureau of Indian Standards: IS-1904, IS-6403, IS-8009, IS-2950, IS-2911 and all other relevant codes.

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