

## Soil-Structure Interaction

### 01ST1306 (PEC)

**Objective of the Course:**

- To understand soil foundation interaction and its importance.
- To familiarize with model analysis for soil-structure interaction analysis.

**Credit Earned: 3**
**Students learning outcomes:**

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

1. Apply soil structure interaction concept and solve complex problems.
2. Determine soil structure interaction for different types of structures under various conditions of loading and subsoil characteristics
3. Evaluate interaction analysis of pile and pile groups with rigid cap.
4. Examine action of group of piles under lateral loading considering stress-strain characteristics of real soils.

#### Teaching and Examination Scheme

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

**Detailed Syllabus**

Sr No.	Title of the unit	Number of hours
<b>1</b>	<b>Basic Soil Models</b>	<b>12</b>
	Introduction to soil-foundation interaction problems, Soil behavior, Foundation behavior, Interface behavior, Scope of soil foundation interaction analysis, soil response models, Winkler, Elastic continuum, Two parameter elastic models, Elastic plastic behavior, Time dependent behaviour	
<b>2</b>	<b>Beam on Elastic Foundation-Soil Models</b>	<b>08</b>
	Infinite beam, Two parameters, Isotropic elastic half space, Analysis of beams of finite length, Classification of finite beams in relation to their stiffness.	

<b>3</b>	<b>Elastic Analysis of Pile</b>	<b>12</b>
	Elastic analysis of single pile, Theoretical solutions for settlement and load distributions, Analysis of pile group, Interaction analysis, Load distribution in groups with rigid cap	
<b>4</b>	<b>Laterally Loaded Pile</b>	<b>10</b>
	Load deflection prediction for laterally loaded piles, Subgrade reaction and elastic analysis, Interaction analysis, Pile-raft system, Solutions through influence charts. Sheet pile walls, Design of supporting systems for excavations.	
		<b>42</b>

### 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. J.E., Bowles, Analytical and Computer Methods in Foundation Engineering, McGraw-Hill Book Co., New York, 1974.
2. C.S. Desai and J.T. Christian (Eds.), Numerical Methods in Geotechnical Engineering, McGraw-Hill Book Co., Yew York.
3. Selva Durai, A. P. S, Elastic Analysis of Soil-Foundation Interaction, Elsevier, 1979.
4. Poulos, H. G., and Davis, E. H., Pile Foundation Analysis and Design, John Wiley, 1980
5. J. W. Bull, Soil-Structure Interaction: Numerical Analysis and Modelling, CRC Press, 1994