

<b>INSTITUTE</b>	<b>FACULTY OF TECHNOLOGY</b>
<b>PROGRAM</b>	<b>BACHELOR OF TECHNOLOGY (CIVIL ENGINEERING)</b>
<b>SEMESTER</b>	<b>6</b>
<b>COURSE TITLE</b>	<b>FOUNDATION ENGINEERING</b>
<b>COURSE CODE</b>	<b>01CI0609</b>
<b>COURSE CREDITS</b>	<b>4</b>

**Objective:**

- 1 To study soil behavior, determination and interpretation of soil parameters, determination of stresses in soil
- 2 To provide students with exposure to the systematic methods for designing foundation
- 3 To gain basic knowledge on foundation selection, foundation forces and its stability under various forces
- 4 To understand the behavior of various problematic soils

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Determine the Soil bearing capacity of shallow foundation using IS code and various methods.
- 2 Select and apply appropriate soil investigation and testing techniques to accurately determine sub-soil parameters
- 3 Identification of problematic soil and classify the foundations as per load-carrying mechanisms
- 4 Design and analyze retaining walls and pile foundation under static loads.

**Pre-requisite of course:**Basics of Geology & Geotechnical Engineering, Advanced Geotechnical Engineering.

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
3	0	2	50	30	20	25	25

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Selection of foundation and Sub - soil exploration/investigation</b> Types of foundation, Factors affecting the selection of type of foundations, steps in choosing types of foundation based on soil condition, Objectives and Planning of exploration program, methods of exploration - wash boring and rotary drilling - depth of boring, soil samples and soil samplers - representative and undisturbed sampling, field penetration tests: SPT, SCPT, DCPT. Introduction to geophysical methods, Bore log and report writing, data interpretation.	6

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
2	<b>Shallow Foundation</b> Introduction, significant depth, design criteria, modes of shear failures. Detail study of bearing capacity theories (Prandtl, Rankine, Terzaghi, Skempton), bearing capacity determination using IS Code, Presumptive bearing capacity. Settlement, components of settlement & its estimation, permissible settlement, Bearing capacity from in-situ tests (SPT, SCPT, PLATE LOAD), Factors affecting bearing capacity including Water Table., Bearing capacity of raft/mat foundation as per codal provisions, Contact pressure under rigid and flexible footings. Floating foundation	11
3	<b>Pile Foundation</b> Introduction, load transfer mechanism, types of piles and their function, factors influencing the selection of pile, their method of installation and their load-carrying characteristics for cohesive and granular soils, piles subjected to vertical loads- pile load carrying capacity from static formula, dynamic formulae (ENR and Hiley), penetration test data & Pile load test (IS 2911)., Pile group: carrying capacity, efficiency and settlement. Negative skin friction.	10
4	<b>Foundations on Problematic Soil &amp; Introduction to Geosynthetics</b> Significant characteristics of expansive soil, footing on such soils, Problems and preventive measures., Under-reamed pile foundation, concept, design & field installation. Significant characteristics of silt and loess, Introduction to geosynthetics-types and uses	9
5	<b>Retaining wall</b> Types of retaining (types of flexible and rigid earth retention systems: counter fort, gravity, diaphragm walls, sheet pile walls, soldier piles and lagging).	6
<b>Total Hours</b>		<b>42</b>

#### Suggested List of Experiments:

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Experiment-1</b> Plate load test (PLT)	2
2	<b>Experiment-2</b> Cyclic Plate Load Test	2
3	<b>Experiment-3</b> Standard Penetration test (SPT)	2
4	<b>Experiment-4</b> Static Cone Penetration test (SCPT)	2
5	<b>Experiment-5</b> Dynamic Cone Penetration test (DCPT)	2
6	<b>Experiment-6</b> Pile Load Test	2

### Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
7	<b>Experiment-7</b> Lateral Pile Load Test	2
8	<b>Experiment-8</b> Pull out Test of Pile	2
9	<b>Experiment-9</b> Electrical Resistivity Test	2
10	<b>Experiment-10</b> Block Vibration Test	2
11	<b>Experiment-11</b> Sub surface investigation - Phase – 1: Site Planning	2
12	<b>Experiment-12</b> Sub surface investigation - Phase – 2: Sampling	2
13	<b>Experiment-13</b> Sub surface investigation - Phase – 3: Testing Schedule	2
14	<b>Experiment-14</b> Sub surface investigation - Phase – 4: Report Preparation	2
<b>Total Hours</b>		<b>28</b>

### Textbook :

- 1 Railway Engineering, Satish Chandra and M.M. Agrawal, Oxford University Press, New Delhi, .

### References:

- 1 Fundamentals of Soil Mechanics, Fundamentals of Soil Mechanics, Taylor D.W, Asia Publishing House, Mumbai, .

### Suggested Theory Distribution:

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

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
5.00	10.00	30.00	30.00	15.00	10.00

### Instructional Method:

- 1 Prerequisite of the course and its pattern shall be discussed on the commencement of the course
- 2 Lectures shall be conducted in class room using various teaching aids
- 3 Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation.

**Instructional Method:**

- 4 At the end of each unit/topic an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work
- 5 The laboratory experiments are planned in such a way that it covers the practical aspects of the course contents. The performance of these experiments shall bring the clarity of the theoretical concepts which the students have studied during the academic sessions

**Supplementary Resources:**

- 1 <https://archive.nptel.ac.in/courses/105/105/105105176/>