

Course Code	Course Name	L-T-P-Credits	Year of Introduction
CE363	GEOTECHNICAL INVESTIGATION	3-0-0-3	2016

Pre-requisite : CE208 Geotechnical Engineering - I

Course objectives:

- To impart to the students, a clear idea about how a geotechnical investigation programme is to be planned and executed;
- To impart in-depth knowledge about the various methods of geotechnical investigation and the field tests to be conducted in different situations.

Syllabus:

Objectives of soil exploration – Planning of a sub-surface exploration programme –Methods of exploration - Sounding methods – Standard Penetration Test - Cone Penetration Tests - Plate load test – Pressure meter test - Geophysical methods –pile load tests -Factors affecting sample disturbance and methods to minimise them –Types of samplers and Core retainers –Rock Quality Designation– Sub-soil investigation report

Expected Outcomes:

- The students will be able to understand the procedure, applicability and limitations of various methods of geotechnical investigation;
- Ability of the students in making proper engineering judgments and in taking appropriate decisions related to geotechnical investigations will be significantly improved.

Text Books:

1. Gopal Ranjan and Rao A.S.R., “ Basic and Applied Soil Mechanics”, New Age International (P) Limited, New Delhi, 2002.
2. Venkataramaiah, “Geotechnical Engineering”, Universities Press (India) Limited, Hyderabad, 2000.

References:

1. Arora K.R., “ Geotechnical Engineering”, Standard Publishers Distributors, New Delhi, 2006.
2. Joseph E. Bowles, ‘Foundation Analysis and Design’, Mc. Graw Hill Inc., New York, 1988.
3. Purushothamaraj P., Soil Mechanics and Foundation Engineering, Dorling Kindersley(India) Pvt. Ltd., 2013
4. Terzaghi K. and R. B. Peck, Soil Mechanics in Engineering Practice, John Wiley, 1967.

COURSE PLAN

Module	Contents	Hours	Sem. Exam Marks %
I	Introduction and practical importance - Objectives of soil exploration – Planning of a sub-surface exploration programme –Collection of existing information, reconnaissance, preliminary and detailed investigation - I.S. and other guidelines for deciding the number, size, spacing and depth of boreholes	7	15

II	<p>Methods of exploration - Open pits – Auger boring- -Wash boring, percussion drilling, rotary drilling – Comparison of the methods of exploration- Stabilization of bore holes</p> <p>Plate load test – Procedure, uses and limitations – modulus of subgrade reaction- Solution of numerical problems using plate load test data</p>	6	15
FIRST INTERNAL EXAMINATION			
III	<p>Sounding methods Standard Penetration Test – Procedure – corrections to be applied to observed N values – Procedure for estimation of representative average N value – Numerical examples - Factors influencing the SPT results and precautions to obtain reliable results – Merits/drawbacks of the test – Correlations of N value with various engineering and index properties of soils</p> <p>Static Cone Penetration Test – Procedure – Merits/drawbacks – Correlation of static CPT results with soil properties -Dynamic Cone Penetration Test – Procedure – Merits/drawbacks – Critical comparison of SPT, static CPT and dynamic CPT</p>	8	15
IV	<p>Geophysical methods – Seismic refraction method – Procedure, uses, limitations – Solution of numerical problems to estimate the velocity of seismic waves and the thickness of upper layer of a two-layered soil system - Electrical resistivity method – Electrical profiling and electrical sounding – Procedure, uses, limitations</p> <p>Pressure meter test - Procedure –Uses - limitations</p>	6	15
SECOND INTERNAL EXAMINATION			
V	<p>Soil sampling – Undisturbed, disturbed, and representative samples – Chunk and tube samples – Factors affecting sample disturbance and methods to minimise them –Area ratio - Inside clearance - Outside clearance - Recovery ratio –Ball check valve – Handling and transportation of samples – Extrusion of samples</p> <p>Types of samplers – Thin walled sampler – Piston sampler – Split spoon sampler – Methods for collection of sand samples from beneath the water table - Core retainers</p>	8	20
VI	<p>Rock Quality Designation –Bore log – Soil profile – Sub-soil investigation report</p> <p>Static pile load test – procedure for estimation of safe load - Cyclic pile load test –Procedure for separation of end bearing and skin friction resistance- solution of numerical problems using static and cyclic pile load test data</p>	7	20
END SEMESTER EXAMINATION			

QUESTION PAPER PATTERN (End semester examination)

Maximum Marks :100

Exam Duration: 3 Hrs

Part A -Module I & II : 2 questions out of 3 questions carrying 15 marks each

Part B - Module III & IV: 2 questions out of 3 questions carrying 15 marks each

Part C - Module V & VI : 2 questions out of 3 questions carrying 20 marks each

Note : 1.Each part should have at least one question from each module

2.Each question can have a maximum of 4 subdivisions (a, b, c, d)

