

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:

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

References:

- Arora K.R., “ Geotechnical Engineering”, Standard Publishers Distributors, New Delhi, 2006.
- Joseph E. Bowles, ‘Foundation Analysis and Design’, Mc. Graw Hill Inc., New York, 1988.
- Purushothamaraj P., Soil Mechanics and Foundation Engineering, Dorling Kindersley(India) Pvt. Ltd., 2013
- 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)

