

B.E. (Civil) Semester: VI
Subject Name: GEOTECHNICAL ENGINEERING-II (CV605)

A. Course Objective:

- To provide a coherent development to the students for the courses in sector of Geotechnical Engineering & Soil Improvement Techniques etc.
- To present the foundations of many basic Engineering tools and concepts related Geotechnical Engineering.
- To give an experience in the implementation of Engineering concepts which are applied in field of Geotechnical Engineering
- To involve the application of scientific and technical principles of planning, analysis, design of foundation along with soil improvement techniques.

B. Teaching /Examination Scheme

Teaching scheme				Total Credit	Evaluation Scheme					Total
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract/ Tut.	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
04	00	02	06	05	03	70	30	20	30	150

C. Detailed Syllabus:

1.Stability of slopes:

Infinite and finite slopes, factor of safety, type of slope failure, stability of infinite slopes, finite slopes forms of slip surfaces, limit equilibrium method and critical stage instability analysis, effects of tension crack and submergence, C-analysis-method of slices, Taylor's stability no., use of Bishop's method.

2.Earth Pressure:

Types of lateral earth pressure, Rankine's and Coulomb's earth pressure, theory and their application for determination of lateral earth pressure under different conditions, Rebhann's and Culmann's Graphical methods of determination of lateral earth pressures.

3.Stress Distribution of Soils:

Causes of stress in soil, geostatic stress, Boussinesque's equation, stress distribution diagrams, Newmark's influence chart Westergard's equation, contact pressure, stresses due to triangular and other loadings.

4. Basics of foundation:

Types of foundation, Factors affecting the selection of type of foundations, steps in choosing types of foundation.

5. Subsurface Investigation:

Objectives of exploration, planning of exploration program, soil samples and soil samplers, field penetration tests: SPT, SCPT, DCPT. Introduction to geophysical methods, Bore log and report writing.

6. Bearing Capacity of Shallow Foundation :

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, allowable bearing pressure. Bearing capacity by use of penetration test data and by plate load test. Bearing capacity of raft. Factors affecting bearing capacity including Water-Table. Contact pressure under rigid and flexible footings. Floating foundation. Types of pavements & its design.

7. Pile foundations :

Introduction, load transfer mechanism, types of piles according to their composition, their method of installation and their load carrying characteristics, piles subjected to vertical loads- pile load carrying capacity from static formula, dynamic formulae (ENR and Hiley), penetration test data & Pile load test. Pile group: carrying capacity, efficiency and settlement. Negative skin friction. Underreamed pile foundation-its concept, design & field installation.

D. Lesson Planning

Sr. No.	Title of the Unit	Minimum Hours	Weightage%
1.	Stability of slopes	11	20
2.	Earth Pressure	10	20
3.	Stress Distribution of Soils	9	8
4.	Basics of foundation	3	2
5.	Subsurface Investigation	5	10
6.	Bearing Capacity of Shallow Foundation	12	20
7.	Pile foundations	10	20
	total	60	100

E. List of Experiments:

Term work shall consist of laboratory work and tutorials (minimum 25 problems) based on above course. Practical examinations shall consist of oral based on term work and above course.

Experiment No.	Name of Experiment
1	Auger boring/sampling
2	Standard penetration test
3	Swelling pressure test
4	Study of model on pile driving.
5	Planning site investigations for a real life problem

F. Instructional method and pedagogy (Continuous Internal Assessment Scheme) (CIA)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and practical which carries marks.
- At regular intervals assignments will be given. Students should submit all assignments during given period.
- Classroom participation and involvement in solving the problems in Tutorial rooms Carries Marks
- Internal exam of 30 marks will be conducted as a part of Mid semester evaluation.
- Experiments shall be performed in the field related to course contents.
- The course includes a practical, where students have an opportunity to build an appreciation for the concept being taught in lectures.

G. Students Learning Outcomes:

- The students will gain an experience in the implementation of Geotechnical Engineering on engineering concepts which are applied in field Geotechnical Engineering.
- The students will get a diverse knowledge of geotechnical engineering practices applied to real life problems of designing of structures.
- The students will learn to understand the theoretical and practical aspects of geotechnical engineering along with the design and management applications.

H. Recommended Study Materials

A.Reference Books:

1. P.Purushothama Raj; Soil Mechanics and Foundation Engineering; Pearson Education.
2. Alamsingh; Soil Mechanics & Foundation Engineering; CBS Publishers & Distributors, Delhi
3. Taylor D.W.; Fundamentals of Soil Mechanics; Asia Publishing House, Mumbai
4. V. N. S. Murthy; Soil Mechanics & Foundation Engineering; CRS Press, Taylor & Francis Group, New York
5. Gopal Ranjan, Rao A.S.R.; Basic and applied soil mechanics; New age int. (p) ltd.
6. Das Braja M; Principles of Geotechnical Engineering; Thomson Asia Pvt. Ltd.

B.Web Materials:

1. <http://edudel.nic.in>
2. <http://bis.org.in/other/quake.htm>
3. <http://www.thepeninsulaneighborhood.com/ThePlan.html>
4. http://www.historytution.com/indus_valley_civilization/town_planning.html