

Kadi Sarva Vishwavidyalaya, Gandhinagar
M.E. (Civil Infrastructure Engineering) Semester: I
 (w.e.f. Academic Year 2017-18)

Subject Name: Geo techniques for Infrastructure

Subject code: MECV102-N

A. Learning objectives:

The objective of this course is

- To understand the soil behaviors before and after application of loads.
- To be able to design various foundations.
- To be aware of various reinforced techniques to enhance soil bearing Capacity of poor soils.

B. Teaching Scheme (Credits and Hours)

Teaching Scheme				Credit Scheme			Evaluation Scheme				
Lect (Hrs)	Tu (Hrs)	Prac. (Hrs)	Total (Hrs)	Theory	Pra/TW	Total	UE	IE	CIA	Prac/Viva	Total
04	02	00	06	04	01	05	70	30	20	30	150

C. Detailed Syllabus

Unit no.

Topics

1 Soil Deposits and Clay Minerals:

Introduction, Formation of soils, Various soil deposits and their engineering suitability, Genesis of clay minerals, Classification and identification, Anion and Cation exchange capacity of clays, Specific surface area, Bonding in clays.

2 Introduction to subsurface investigation:

Scopes and objectives of exploration, Planning a subsurface exploration, stages in sub surface exploration, Explorations for preliminary and detailed design, spacing and depth of exploration.

3 Open Excavation and Boring of exploration:

Pits and Trenches, Drifts and Shafts, Methods of boring, Auger Borings, Wash Borings, Rotary Drilling, Percussion Drilling, Core Drilling.

4 Soil samples and Soil Samplers:

Types of soil samples, Disturbed samples, Undisturbed samples, Design Features affecting the sample Disturbance, Split spoon samplers, Scraper Bucket Samplers, Shell by Tubes and Thin walled Samplers, Piston Samplers, Denis Samplers, Preservation and handling of samples.

5 Geo Physical Methods:

Geophysical methods, types, Seismic Methods, Electrical Resistivity Methods, Electrical Profiling Method, Electrical Sounding Method, seismic refraction method, Sub soil Investigation Report.

6 Introduction to Shallow foundations:

Theories of bearing capacity (Prandtl, Rankine, Terzaghi, Skempton, I.S.Method), standard penetration test, design of a footing in cohesion less/cohesive soil based on settlement and bearing capacity criteria, plate load test.

7 Pile foundations:

Various types, size proportioning and stability analysis. Pile foundations, driven piles in cohesive/cohesion less soil, bearing capacity/settlement aspects, analysis and design of pile groups, bored cast-in, situ piles, pile driving equipment.

8 Machine Foundation:

Machine foundation, Types of machine foundation, General criteria, Theory of vibration,

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Single degree freedom system, Soil dynamic parameters, Block type machine foundation (Checking of resonance and permissible amplitude), vibration isolation techniques

9 Drainage & Dewatering Methods:

Requirements of filters used in earth dams, control of seepage through earth structures, open sumps and ditches, well point systems, deep well drainage, vacuum dewatering, electro osmosis methods, Types of drains & their components.

D. Lesson Planning:

Unit No.	Topics	Hours	Weightage (%)
1	Soil Deposits and Clay Minerals	06	10
2	Introduction to subsurface investigation	02	4
3	Open Excavation and Boring of exploration	03	4
4	Soil samples and Soil Samplers	03	4
5	Geo Physical Methods	03	4
6	Introduction to Shallow foundations:	12	19
7	Pile foundations	12	19
8	Machine Foundation	11	18
9	Drainage & Dewatering Methods	08	18
Total		60	100

E. List of tutorials

- 1 Soil Deposits and Clay Minerals
- 2 Introduction to subsurface investigation and numerical based on SPT No
- 3 Open Excavation and Boring of exploration, soil samples and Soil Samplers, Geo Physical Methods
- 4 Shallow foundations
- 5 Pile foundations
- 6 Machine Foundation
- 7 Drainage & Dewatering Methods

F. Instructional Method and Pedagogy (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 10 Marks Weightage.
- One internal exam will be conducted.
- Assignment/Surprise tests/Quizzes/Seminar will be conducted which carries 5 marks as a part of internal theory evaluation.
- The course includes a assignments, where students have an opportunity to build an appreciation for the concepts being taught in lectures.

G. Students Learning Outcomes:

On successfully completion of term

- Students will learn planning and execution of soil exploration techniques.
- Student will able to work out field soil bearing capacity with appropriate methods & tools.
- Students will know the various I.S. code criteria for SPT test and results.

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H. Recommended Study Material:

- Arora, K.R., Soil Mechanics & Foundation Engineering, Standard Publication, New Delhi.
- Punamia, B.C., Soil Mechanics & Foundation Engineering, Laxmi Publication Pvt. Ltd., New Delhi.
- Murthy, V.N.S., Soil Mechanics & Foundation Engineering; Sai Kripa Technical Consultants, Bangalore.
- Shroff A. V., Shah D. L., “Soil Mechanics & Geotechnical Engineering”, Oxford- IBH New Delhi.

I. Reference Books:

1. Singh Alam, Soil Engineering, Vol. – I and II, Asia Publication House.
2. Fang and Einterkorn, Foundation Engineering Handbook.
3. Peck, Thomson and Thornburn, Foundation Engineering,
4. Shamsheer Prakash and Gopal Ranjan, Analysis and Design of Retaining Structures, Sarita Publications.
5. Sribivasula and Vaidyanathan, Handbook of Machine Foundation, Tata McGraw Hill Book Co., New Delhi.
6. Das B M “Principles of Foundation Engineering” PWS Publishing Co., Boston, 1990.
7. Bowles J E “Foundation Analysis & Design” McGraw Hill Inc. New York, 1988.

J. Web Materials:

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