

DEPARTMENT OF CIVIL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Course Title	GEOTECHNICAL ENGINEERING- II		
Course Code	CEPC 19	No. of Credits	3
Course Code of Pre-requisite subject(s)	Nil		
Session	Aug' 2022	Section (if, applicable)	A&B
Name of Faculty	Dr. Jeevan Joseph	Department	Civil Engineering
Email	jeevan@nitt.edu	Telephone No.	9619474630
Name of Course Coordinator(s) (if, applicable)	Nil		
E-mail	--	Telephone No.	--
Course Type	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
Soil exploration - Planning - Augur boring - Soundings - Sampling - Plate load test, static and dynamic penetrations tests - geophysical explorations.			
Lateral Earth Pressure – Plastic equilibrium - Rankine's theory - Active and passive earth pressure for cohesionless and cohesive soils - Earth pressure at rest - Coloumb's wedge theory - Rebhann's and Culmann's graphical solutions, Stability analysis			
Foundation - functions and requisites- Different types - choice of foundation type – general principles of design. Bearing capacity - types of failures - Prandtl's and Terzaghi's bearing capacity analysis - Bearing capacity based on settlement and building codes			
Shallow foundation - spread footings - combined footings - trapezoidal and strap footings -Raft foundation - Contact pressure distribution - settlement analysis - Types of settlement, Control			
Deep foundation - piles - types - load carrying capacity of pile - static and dynamic formula - pile load test - penetration test - pile groups - Efficiency - Feld's rule – Converse Labarre formula, Settlement of piles and pile groups - Negative skin friction – under-reamed piles			

References

1. Murthy, V.N.S, A text book of Soil Mechanics and Foundation Engineering, UBS Publishers & Distributors Pvt. Ltd., New Delhi 1999.
2. Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publications Pvt. Ltd., New Delhi, 1995.
3. Gopal Ranjan and Rao, Basic and Applied Soil Mechanics, New Age International (P) Limited, New Delhi, 2002.
4. Nainan P Kurian, Design of foundation Systems Principles and Practices, Narosa, 2011
5. Braja M. Das, Principles of Foundation Engineering, Thomson Asia Pvt. Ltd., Singapore, 2005.
6. Donald P. Coduto, Man-Chu Ronald Yeung and William A. Kitch, Geotechnical Engineering, Principles and Practices, PHI Learning Private limited, 2011.
7. Joseph E. Bowles, Foundation Analysis and Design, McGRAW-Hill, 1998.
8. Shenbaga R Kaniraj, Design Aids in Soil Mechanics and Foundation Engineering, Tata McGraw Hill, 2011.

COURSE OBJECTIVES

1. To emphasize the importance of soil investigations including destructive and non-destructive methods.
2. To explain how earth pressure theory is important in retaining structure design
3. To explain the concept of bearing capacity and how to estimate the safe bearing capacity for various foundation system including settlement consideration
4. To explain how to select a suitable shallow foundation system for various site conditions and also analysis of different foundation system
5. To explain in what circumstances pile is needed and how to estimate pile and pile group capacity under various soil conditions.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
Upon completion of this course, the students will be able to	
1. Understand the importance of soil investigation for any civil engineering construction	1, 2, 3 & 4
2. Analysis any earth retaining structures for any kind of soil medium.	1, 2, 3 & 4
3. Do proper bearing capacity estimation including IS code methods	1, 2, 3, 4, 5, 7 & 8
4. Do proper foundation proportioning for any kind of shallow foundation system and also get exposed in foundation analysis	1, 2, 3, 4, 5, 7 & 8
5. To estimate pile and pile group capacity for any kind of soils including group efficiency and negative friction	1, 2, 3, 4, 5, 7 & 8

COURSE OVERVIEW**COURSE PLAN – PART II**

The major focus of the subject Geotechnical Engineering-I was to introduce the concepts of soil mineralogy, followed by the soil classification, significance of index and engineering properties of soil. Whereas, in geotechnical Engineering-II, more emphasis is given for the application of soil mechanics for solving real life problems. The subject is well organized comprising of state of the art soil exploration techniques, and the methods for estimating the safe bearing capacity of soil. Moreover, design aspects of shallow and deep foundations are also discussed in detail.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1 /3 hrs	Soil exploration – Introduction, Need and extent of exploration- stages in investigation	Class room discussions
2	Week 2 /3 hrs	Direct and indirect methods of exploration.	Class room discussions
3	Week 3 /3 hrs	SPT Tests, correlations, corrections, Sampling- split spoon sampler	Class room discussions
4	Week 4 /3 hrs	Plate load test, Geophysical techniques for exploration	Class room discussions
5	Week 5 /3 hrs	Lateral Earth Pressure – Plastic equilibrium	Class room discussions
6	Week 6 /3 hrs	Rankine's theory - Active and passive earth pressure for cohesionless and cohesive deposits	Class room discussions
7	Week 7 /3 hrs	Coloumb's wedge theory, Rebhann's and Culmann's graphical solutions, Slope stability analysis, Stability analysis	Class room discussions
8	Week 8 /3 hrs	Foundation - functions and requisites- Different types - choice of foundation type	Class room discussions
9	Week 9 /3 hrs	Types of failures, – general principles of design.	Class room discussions
10	Week 10 /3 hrs	Prandtl's and Terzaghi's bearing capacity analysis, IS code method	Class room discussions
11	Week 11 /3 hrs	Shallow foundation - spread footings - combined footings, Trapezoidal and strap footings	Class room discussions
12	Week 12 /3 hrs	Raft foundation Contact pressure distribution – settlement analysis	Class room discussions

13	Week 13 /3 hrs	Deep foundation - piles - types - load carrying capacity of pile – static analysis and dynamic analysis	Class room discussions
14	Week 14 /4 hrs	pile load test Settlement of piles and pile groups, Negative skin friction – under-reamed piles	Class room discussions
15	Week 15 /4 hrs	pile groups - Efficiency - Feld's rule – Converse Labarre formula	Class room discussions

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	CT-1	3 rd Week of Sept	1 hr	20
2	CT-2	3 rd Week of Sept	1 hr	25
3	Assignment	1 from each module	1 week	15
4	Final Assessment *	2 nd t Week of Dec	3 hr	40

COURSE EXIT SURVEY

1. Class committee meetings.
2. Mid semester –feedback will be collected in the class room
3. Online - Feedback forms submission through MIS.

COURSE POLICY

PASSING MINIMUM

35% cumulative and with 20 % minimum for End sem.

COMPENSATION ASSESSMENT

Retest would only be given to those students who have missed CT-1 or CT-2 exam on genuine grounds. The entire portion would be included for the retest.

ATTENDANCE POLICY

- At least 75 % attendance in each course is mandatory.

ACADEMIC DISHONESTY & PLAGIARISM

- Plagiarism and/or copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

ADDITIONAL INFORMATION, IF ANY

The Course Faculty Details: Room No.:18 (Civil-Department)

Timings: 09:00-5:00 P.M.

Email ID: jeevan@nitt.edu

Telephone No.: 9619474630

FOR APPROVAL



Dr. Jeevan Joseph
Course Faculty:



Dr. Manjula R
CC- Chairperson



Dr. G. Swaminathan
HOD