



**NATIONAL INSTITUTE OF TECHNOLOGY,
TIRUCHIRAPPALLI**

DEPARTMENT OF CIVIL ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech. Civil Engineering		
Course Title	Geotechnical Engineering- I		
Course Code	CEPC 16	No. of Credits	3
Course Code of Pre-requisite subject(s)	NIL		
Session	IV-Semester/Jan/2021	Section (if, applicable)	-
Name of Faculty	Dr. Deendayal	Department	Civil Engineering
Official Email	deendayal@nitt.edu	Telephone No.	0431-2053170
Name of Course Coordinator(s)	Dr. Deendayal		
Official E-mail	deendayal@nitt.edu	Telephone No.	
Course Type (please tick appropriately)	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
Syllabus (approved in BoS)			
<p>Historical development of Soil Engineering - Origin and general types of soils - soil structure, clay minerals-Three phase system- Identification and Classification of soils.</p> <p>Soil water - capillary phenomena - concept of effective and neutral stresses – Permeability - determination of coefficient of permeability in the laboratory - Seepage flow - Head, gradient, pressure - steady state flow - two dimensional - flow net.</p> <p>Vertical stress distribution in soil - Boussinesq and Westergaard's equation - Newmark's influence chart - principle, construction and use - Equivalent point load and other approximate methods - pressure bulb - Compaction.</p> <p>Shear strength - Mohr-Coulomb failure criterion - shear strength tests – Different drainage conditions - Shear properties of cohesionless and cohesive soils - Use of Mohr's circle - relationship between principal stresses and shear parameters.</p> <p>Compressibility and consolidation - Terzaghi's one dimensional consolidation theory - pressure void ratio relationship - preconsolidation pressure - Total settlement and time rate of settlement - coefficient of consolidation - curve fitting methods - Correction for construction time.</p>			



**NATIONAL INSTITUTE OF TECHNOLOGY,
TIRUCHIRAPPALLI**

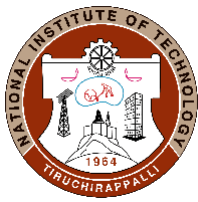
COURSE OBJECTIVES	
1. To explain how three phase system is used in soil and how are soil properties estimated using three phase system 2. To explain the role of water in soil behaviour and how soil stresses, permeability and quantity of seepage including flow net are estimated 3. To emphasise the importance of soil stress distribution and stress influence due to varies loads. 4. To explain how soil shear parameters are affected by drainage conditions 5. To estimate the magnitude and time-rate of settlement due to consolidation	
MAPPING OF COs with POs	
Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. Understand the importance of geotechnical engineering in civil engineering and do proper soil classification and the phase system to solve problems	1,2,3,4,6,7,8
2. Solve any practice problems related to soil stresses estimation, permeability, seepage including flow net diagram.	4,5,6,7,8,11,12
3. Do proper stress estimation under any system of foundation loads	4,7
4. Estimate appropriate soil strength parameters with respect to the drainage conditions	2,3,4,7
5. Solve any practical problems related to consolidation like consolidation settlement, time rate of settlement	2,3,4,5,7

COURSE PLAN – PART II			
COURSE OVERVIEW			
The course elaborates various ground improvement techniques along with principles, design issues and construction procedures.			
COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Week	Topic	Mode of Delivery
1	Week 1	Historical development of Soil Engineering - Origin and general types of soils -	PPT & Virtual Mode
2	Week 2	soil structure, clay minerals-Three phase system- Identification and Classification of soils.	PPT & Virtual Mode
3	Week 3	Soil water - capillary phenomena - concept of effective and neutral stresses – Permeability - determination of coefficient of permeability in the laboratory -	PPT & Virtual Mode



**NATIONAL INSTITUTE OF TECHNOLOGY,
TIRUCHIRAPPALLI**

4	Week 4	Seepage flow - Head, gradient, pressure - steady state flow - two dimensional - flow net.	PPT & Virtual Mode
5	Week 5	Assessment-1	
6	Week 6	Vertical stress distribution in soil - Boussinesq and Westergaard's equation	PPT & Virtual Mode
7	Week 7	Newmark's influence chart - principle, construction and use	PPT & Virtual Mode
8	Week 8	Equivalent point load and other approximate methods - pressure bulb - Compaction.	PPT & Virtual Mode
9	Week 9	Shear strength - Mohr-Coulomb failure criterion - shear strength tests – Different drainage conditions	PPT & Virtual Mode
10	Week 10	Shear properties of cohesionless and cohesive soils	PPT & Virtual Mode
11	Week 11	Use of Mohr's circle - relationship between principal stresses and shear parameters.	PPT & Virtual Mode
12	Week 12	Assessment-2	
13	Week 13	Compressibility and consolidation - Terzaghi's one dimensional consolidation theory	PPT & Virtual Mode
14	Week 14	pressure void ratio relationship - preconsolidation pressure - Total settlement and time rate of settlement	PPT & Virtual Mode
15	Week 15	- coefficient of consolidation - curve fitting methods - Correction for construction time.	PPT & Virtual Mode



**NATIONAL INSTITUTE OF TECHNOLOGY,
TIRUCHIRAPPALLI**

16	Week 16	Final Assessment		
COURSE ASSESSMENT METHODS				
S.No.	Mode of Assessment	Week	Duration	% Weightage
1	Assessment-I	5 th Week	1/2 hour	20 marks
2	Assessment-II	12 th Week	1/2 hour	20 marks
3	Assignments-5 & PPTs-1	Every 2 weeks	1 week time	6x5=30marks
	CPA-Compensation Assessment*	16 th week	1/2 hour	20 marks
5	Final Assessment *	16 th / 17 th week	2 hour	30 marks
6	Total			100 marks
*mandatory; refer to guidelines on page 6				
ESSENTIAL READINGS : Textbooks, reference books and journals.				
<p>References:</p> <ol style="list-style-type: none"> 1. Gopal Ranjan Rao, P. Basic and Applied Soil Mechanics, New Age International Pvt. Limited, New Delhi, 2002. 2. Murthy, V.N.S., A text book of Soil Mechanics and Foundation Engineering, UBS Publishers Distributors Ltd., New Delhi, 1999 Department of Civil Engineering, National Institute of Technology: Tiruchirappalli – 620 015 26 Page 3. Punmia, B.C. Soil Mechanics and Foundation Engineering, Laxmi Publications Pvt. Ltd., New Delhi, 1995. 4. Braja M. Das, Fundamentals of Geotechnical Engineering, Thomson Asia Pvt. Ltd., Singapore, 2005. 5. Braja M. Das, Principles of Geotechnical Engineering, Thomson Asia Pvt. Ltd., Singapore, 2008. 6. Robert D. Holtz, William D. Kovacs and Thomas C. Sheahan, An Introduction to Geotechnical Engineering, Pearson, 2013. 7. Donald P. Coduto, Man-Chu Ronald Yeung and William A. Kitch, Geotechnical Engineering, Principles and Practices, PHI Learning Private limited, 2011. 				
COURSE EXIT SURVEY				



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

1. Class committee meetings.
2. Online - Feedback forms submission through MIS.

COURSE POLICY (including compensation assessment to be specified)

- Minimum 75% attendance is compulsory for attending the final examination.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.


ACADEMIC DISHONESTY & PLAGIARISM


- Possessing a mobile phone, carrying bits of paper, talking to other students, 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.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

The Course Coordinator's Room No. : 101 (Civil- Annex Building)
Timings : 10 a.m. to 5 p.m.
Email ID : deendayal@nitt.edu
Telephone No. : 0431-250-3170

FOR APPROVAL


Course Faculty _____


CC- Chairperson _____
Dr. Sunitha V


HOD _____
Head
Department of Civil Engineering
National Institute of Technology
Tiruchirappalli - 620 015.



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

Guidelines

- The number of assessments for any theory course shall range from 4 to 6.
- Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- Necessary care shall be taken to ensure that the course plan is reasonable and is objective.