

DEPARTMENT OF CIVIL ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN			
Course Title	Geotechnical Engineering-I		
Course Code	CEPC 19	No. of Credits	3
Department	CIVIL ENGINEERING	Faculty	Dr. K.Muthukkumaran
Pre-requisites Course Code	NIL		
Course Coordinator(s) (if, applicable)	NIL		
E-mail	kmk@nitt.edu	Telephone No.	04312503168/3198
Course Type	Core course <input checked="" type="checkbox"/>	Elective course	<input type="checkbox"/>
COURSE OVERVIEW			
<p>Geotechnical Engineering is the branch of civil engineering concerned with the design and construction of foundations, slopes, retaining walls, embankments, tunnels, levees, wharves, landfills and similar facilities; and with the engineering characterization and behavior of the ground and its constituent materials. Geotechnical Engineering plays a key role in all civil engineering projects built on or in the ground. Geotechnical Engineering is vital for the assessment of natural hazards such as earthquakes, liquefaction, sinkholes, rock falls and landslides.</p> <p>The subject Geotechnical Engineering-I is focus on fundamentals of soil mechanics and associate topics in soil mechanics. Basically soil is a three phase system consisted on solids, liquids and gasses. The soil behaviour will be highly complex in nature due to various particle sizes and shapes. The soil behaviour and mechanics will be assessed based on the solids and fluid theories.</p>			
COURSE OBJECTIVE			
<ul style="list-style-type: none">➤ To explain what Geotechnical Engineering is and how it is important to civil engineering➤ To explain how three phase system is used in soil and how are soil properties estimated using three phase system➤ To explain role of water in soil behaviour and how soil stresses, permeability and quantity of seepage including flow net are estimated➤ To determine shear parameters and stress changes in soil due to foundation loads➤ To estimate the magnitude and time-rate of settlement due to consolidation			
COURSE OUTCOMES (CO)			

Course Outcomes	Aligned Programme Outcomes (PO)
<p>Upon completion of this course, the students will be able to</p> <ul style="list-style-type: none"> ➤ Understand the importance of geotechnical engineering in civil engineering ➤ Do proper soil classification and three phase system to solve the problems ➤ Solve any practice problems related to soil stresses estimation, permeability, seepage including flow net diagram. ➤ Do proper stress estimation under any system of foundation loads ➤ Solve any practical problems related to consolidation like consolidation settlement, time rate of settlement 	<p>1, 2, 3 & 4</p> <p>1, 2, 3 & 4</p> <p>1, 2, 3, 4, 5, 7 & 8</p> <p>1, 2,3,4,5, 7 & 8</p> <p>1,2,3,4,5,6,7 & 8</p>

COURSE TEACHING AND LEARNING ACTIVITIES

S.No	Week	Topic	Mode of Delivery
1	Week 1	Historic development of soils-origin of soils soil structure and clay mineralogy	PPT & Black board
2	Week 2	Three phase system & Index properties of soils	PPT & Black board
3	Week 3	Identification and classification of soils & ASSESSMENT-1	PPT & Black board
4	Week 4	Soil water capillarity phenomena and permeability	PPT & Black board
5	Week 5	Concept of effective stress and neutral stresses	PPT & Black board
6	Week 6	Seepage pressure & Seepage analysis-steady state flow	PPT & Black board
7	Week 7	Two dimensional flow & flow net & ASSESSMENT-2	PPT & Black board
8	Week 8	Vertical stress distribution-Boussinesq's & Westergaard's theories	PPT & Black board
9	Week 9	Newmark's influence chart, equivalent point load method and approximate methods	PPT & Black board
10	Week 10	Compaction & ASSESSMENT-3	PPT & Black board
11	Week 11	Shear strength- Mohr Coulomb failure criteria, shear strength tests and drainage conditions	PPT & Black board
12	Week 12	Shear strength- shear properties of cohesionless and cohesive soils, use of Mohr's circle	PPT & Black board
13	Week 13	Relation between principal stresses and shear parameters & ASSESSMENT-4	PPT & Black board
14	Week 14	Compressibility and consolidation- Terzaghi's 1-D consolidation theory- preconsolidation pressure	PPT & Black board
15	Week 15	Total settlement and time rate of settlement - coefficient of consolidation	PPT & Black board
16	Week 16	Curve fitting methods - Correction for construction time & ASSESSMENT-5	PPT & Black board
17	Week 17	Final Assessment	

COURSE ASSESSMENT METHODS				
S.No	Mode of Assessment	Week	Duration	% Weightage
1	Assessment-I (surprise test)	3 rd Week	1 hour	10 marks
2	Assessment-II (surprise test)	7 th Week	1 hour	10 marks
3	Assessment-III (surprise test)	10 th Week	1 hour	10 marks
4	Assessment-IV (surprise test)	13 th Week	1 hour	10 marks
5	Assessment-V (surprise test)	16 th Week	1 hour	10 marks
6	Final Assessment	17 th /18 th Week	3 hour	50 marks
7	Total			100 marks

ESSENTIAL READINGS : Reference books and journals.

Reference Books:

1. Gopal Ranjan and 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
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.

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 (including plagiarism, academic honesty, attendance, etc.)

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

ADDITIONAL COURSE INFORMATION

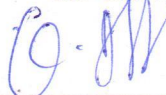
The Course Faculty Details: Room No.: C-8, Civil Engineering Department
 Timings: after 4.00PM/ if not available contact C1 lab at the ground floor
 Email ID: kmk@nitt.edu
 Telephone No.: 04312503168/3198

FOR SENATE'S CONSIDERATION

Course Faculty

(Dr. K. Muthukkumaran)

CC-Chairperson



HOD

23/17

