

**DEPARTMENT OF CIVIL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech Civil Engineering		
Course Title	Earth Retaining Structures		
Course Code	CE 804	No. of Credits	3
Course Code of Pre-requisite subject(s)			
Session	Jan, 2021	Section (if, applicable)	Core
Name of Faculty	Dr. Jeevan Joseph	Department	Civil Engineering
Email	jeevan@nitt.edu	Telephone No.	9619474630
Name of Course Coordinator(s) (if, applicable)	Dr. K. Muthukkumaran		
E-mail	kmk@nitt.edu	Telephone No.	
Course Type	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
Syllabus (approved in BoS)			
<p>Introduction – State of stress in retained soil mass – Earth pressure theories – Classical and graphical techniques – Active and passive cases – Earth pressure due to external loads, empirical method - Wall movement and complex geometry.</p> <p>Retaining structure – Selection of soil parameters - Lateral pressure due to compaction, strain softening, wall flexibility, drainage arrangements and its influence. – Stability analysis of retaining structure both for regular and earthquake forces.</p> <p>Types of sheet piles - Analysis and design of cantilever and anchored sheet pile walls – free earth support method – fixed earth support method - Design of anchor systems - isolated and continuous.</p> <p>Lateral pressure on sheeting in braced excavation, stability against piping and bottom heaving. Earth pressure around tunnel lining, shaft and silos – Soil anchors – Soil pinning – Basic design concepts.</p> <p>Basic principles – Slurry characteristics – Specifications - Diaphragm and bored pile walls – stability analysis and design.</p> <p>References</p> <ol style="list-style-type: none"> 1. Winterkorn.H.F and Fang.H.Y, “Foundation Engineering Handbook”, Galgotia Book- source, 2000. 2. Day.R.W, “Geotechnical and Foundation Engineering: Design and Construction”, McGraw Hill, 1999. 3. Muni Budhu, Foundations and Earth Retaining Structures, Wiley, 2010. 4. Clayton.C.R.I, Militisky, J. and Woods, R.I., “Earth pressure and EarthRetaining structures” (Third Edition), Survey University Press, 2014. 5. McCarthy.D.F, “Essentials of Soil Mechanics and Foundations: Basic Geotechnics” (Sixth Edition), Prentice Hall, 2002. 			

COURSE OBJECTIVES

1. To identify the types, advantages, and disadvantages of the different earth retaining systems.
2. To quantify the lateral earth pressures associated with different earth retaining systems.
3. To gain knowledge on analysis and design of retaining structures.
4. To evaluate the stability of retaining structures under regular and earthquake forces

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)*										
	a	b	c	d	e	f	g	h	i	j	k
To calculate earth pressure on various earth retaining structures such as retaining walls, sheet piles, bulkheads, bracing/struts and coffer dams.	H	M	H		M	L					
To design a relevant earth retaining structure for given soil condition	M	H	H	M	M	H					
To design sheet pile with and without anchors	M	M	H		L	H	M	L	M	L	
To analyse earth pressures on shafts, conduits and tunnels.	M	H	H	L	L	M	M	L	H	M	L

* a: Scholarship of Knowledge; b: Critical Thinking; c: Problem Solving; d: Research Skill; e: Usage of modern tools; f: Collaborative and Multidisciplinary work; g: Project Management and Finance; h: Communication; i: Life-long Learning; j: Ethical Practices and Social Responsibility; k: Independent and Reflective Learning

COURSE PLAN – PART II**COURSE OVERVIEW**

The course is designed in such a way to impart the significance of geo-environmental issues pertaining to the contemporary engineering practises.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1.	Week 1	Introduction – Earth pressure theories - State of stress in retained soil mass	Online Lecture
2.	Week 2	Classical and graphical techniques – Active and passive cases	Online Lecture
3.	Week 3	Earth pressure due to external loads, empirical method- Wall movement and complex geometry.	Online Lecture
4.	Week 4	Retaining structure – Selection of soil parameters Lateral pressure due to compaction, strain softening, wall flexibility, drainage arrangements and its influence	Online Lecture

5.	Week 5	Stability analysis of retaining structure both for regular and earthquake forces.	Online Lecture
6.	Week 6	Types of sheet piles - Analysis and design of cantilever and anchored sheet pile walls	Online Lecture
7.	Week 7	free earth support method – fixed earth support method	Online Lecture
8.	Week 8	Design of anchor systems - isolated and continuous.	Online Lecture
9.		Mid Semester Examination	
10.	Week 10	Lateral pressure on sheeting in braced excavation, stability against piping and bottom heaving.	Online Lecture
11.	Week 11	Earth pressure around tunnel lining, shaft and silos	Online Lecture
12.	Week 12	Case study Presentation	Online Lecture
13.	Week 13	Soil anchors – Soil pinning –Basic design concepts.	Online Lecture
14.	Week 14	Basic principles – Slurry characteristics – Specifications	Online Lecture
15.	Week 15	Diaphragm and bored pile walls stability analysis and design.	Online Lecture
16.	Week 16		Online Lecture

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assignment-1	3 rd Week of Feb	1 week time for submission	10
2	Assignment-2	1 st week of May		10
3	MID SEM	3 rd Week of March	2 hr	20
4	Quiz	4 th week of April		15
5	Case study Presentation	3 rd Week of April	10 min/person	15
CPA	Compensation Assessment*	1 st Week of Dec	2 hour	

6	Final Assessment *	3 rd week December	2 hours	30
<p>*A minimum of 30 % for the Final assesment and a cumulative of 40 % (summing up all the mode of assesment) is mandatory for passing the subject.</p>				
<p>COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)</p> <p>It is proposed to take feedback from the students, at the end of the semester to evaluate the execution of the course.</p>				
<p>COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)</p>				
<p><u>MODE OF CORRESPONDENCE (email/ phone etc)</u></p> <ul style="list-style-type: none"> • Mode of correspondence would be through Email and phone calls • • <u>COMPENSATION ASSESSMENT POLICY</u> • Compensatory assessment shall be given for students providing genuine reasons (reported with in a weeks' time from the actual date of assessment) for their absentia during the regular assessments. • Written examination for a time duration of 2 hr, covering the entire syllabus would be compensatory assessment policy for students missing Mid Semester. • Students missing Assessment 1,2,4 and 5 may have to undergo the same assessment methodology scheduled in the actuals. 				
<p><u>ATTENDANCE POLICY</u> (A uniform attendance policy as specified below shall be followed)</p> <ul style="list-style-type: none"> ➤ At least 75% attendance in each course is mandatory. ➤ Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade. 				
<p><u>ACADEMIC DISHONESTY & PLAGIARISM</u></p> <ul style="list-style-type: none"> ➤ 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. <p>The above policy against academic dishonesty shall be applicable for all the programmes.</p>				

ADDITIONAL INFORMATION

- The Course instructor would be available for discussions, if any, during office hours, at Room No:18; Civil Dept.
- Students are free to post any queries or clarifications to **jeevan@nitt.edu**.

FOR APPROVAL



Dr. Jeevan Joseph
Course Faculty



Dr. S. Moses Santhakumar
CC-Chairperson



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Department of Civil Engineering
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Dr. G. Swaminathan
HOD