

## 19CE4501B - FOUNDATION ENGINEERING

Course Category:	Program Elective	Credits:	3
Course Type:	Theory	Lecture-Tutorial-Practical:	3-0-0
Prerequisites:	19CE3405 - Geotechnical Engineering	Continuous Evaluation:	30
		Semester End Evaluation:	70
		Total Marks:	100

### Course Outcomes

Upon successful completion of the course, the student will be able to:

<b>CO1</b>	<b>Understand</b> the sampling methods used in-site.	K2
<b>CO2</b>	<b>Understand</b> the various types of shallow foundations and decide on their location based on soil characteristics.	K2
<b>CO3</b>	<b>Design</b> Piles based on the principles of bearing capacity.	K3
<b>CO4</b>	<b>Estimate</b> the earth pressures.	K5
<b>CO5</b>	<b>Analyse</b> the stability of slopes	K4

### Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	2			2								3	2
<b>CO2</b>	3	2	2										3	2
<b>CO3</b>	3	2			2								3	2
<b>CO4</b>	3	2											3	2
<b>CO5</b>	3	2	2										3	2
<b>Avg.</b>	3	2	2										3	2

1- Low

2-Medium

3-High

## Course Content

<b>UNIT-1</b>	<p><b>Subsoil Exploration</b> Methods of subsoil exploration, direct, indirect methods, soundings by standard, dynamic cone and static cone penetration tests. Boring &amp; Sampling: Types of boring, types of samples, criteria for undisturbed samples, transport and preservation of samples, bore-logs, planning of exploration programs, report writing.</p>	<b>CO1</b>
<b>UNIT-2</b>	<p><b>Shallow Foundations, Bearing Capacity Criteria</b> Types of foundations and factors to be considered in their location, bearing capacity, criteria for determination of bearing capacity, factors influencing bearing capacity, analytical methods to determine bearing capacity, Terzaghi's theory, IS Methods. <b>Settlement Criteria:</b> Safe bearing pressure based on N- value, allowable bearing pressure; safe bearing capacity and settlement from plate load test, Types of foundation settlements and their determination, allowable settlements of structures.</p>	<b>CO2</b>
<b>UNIT-3</b>	<p><b>Pile Foundations</b> Classification, load carrying capacity of single pile, dynamic formula, static formula, pile load, cyclic pile load tests, load capacity of pile groups, Feld's rule, average efficiency of pile groups, settlement of pile groups, negative skin friction on plies, under reamed pile foundations in expansive sub-soils. <b>Caissons:</b> Introduction, various forces acting and types of caissons: box, open (well), pneumatic, different shapes and cross sections of well foundations, different components of well, grip length, problems in well sinking and remedial measures.</p>	<b>CO3</b>
<b>UNIT-4</b>	<p><b>Earth Pressure</b> Types of earth pressures, Rankine's active and passive earth pressures, smooth</p>	<b>CO4</b>

	vertical wall with horizontal backfill, extension to Coulomb's wedge theory, Rebhann's graphical method for active earth pressure. <b>Bulkheads:</b> Classification, introduction to ground improvement techniques.	
<b>UNIT-5</b>	<b>Stability of Slopes</b> Infinite and finite earth slopes in sand and clay, types of failures, factors influencing slope stability. Stability Analysis: Swedish slip circle – $\phi = 0$ analysis, $c-\phi$ analysis, Fellenius method of locating critical slip centre, friction circle methods, Taylor's stability number, Bishop's method of stability analysis.	<b>CO5</b>
<b>Learning Resources</b>		
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Gopala Ranjan and A.S.R. Rao, Basic and Applied Soil Mechanics, New age Publishers, 2000.</li> <li>2. C. Venkataramaiah, Geotechnical Engineering, New Age Publishers, 2006...</li> </ol>	
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>4. V.N.S. Murthy, Soil Mechanics, Foundation Engineering, UBS Publishers, 2011.</li> <li>5. J.E. Bowles, Foundation Analysis and Design, McGraw Hill, Publishers, 2001.</li> <li>6. M.D. Braja, Principles of Geotechnical Engineering, 7/e, Cengage Learning: 2013.</li> <li>7. P.C. Donald, Geotechnical Engineering, Prentice-Hall India, 2010.</li> <li>8. Rodrigo Salgado, The Engineering of Foundations, McGraw Hill, 2006.</li> </ol> <p>Iqbal H, Khan, Textbook of Geotechnical Engineering, Prentice Hall of India, 2005.</p>	
<b>e-Resources &amp; other digital material</b>	<ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/105105176/">https://nptel.ac.in/courses/105105176/</a> <a href="http://jntuk-coeerd.in/">http://jntuk-coeerd.in/</a></li> </ol>	