

## FOUNDATION ENGINEERING

<b>VIII Semester: CE</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACE018	<b>Core</b>	3	-	-	3	30	70	100
<b>Contact Classes: 45</b>		<b>Tutorial Classes: Nil</b>			<b>Practical Classes: Nil</b>		<b>Total Classes: 45</b>	
<p><b>COURSE OBJECTIVES:</b>  <b>The course should enable the students to:</b></p> <ol style="list-style-type: none"> <li>I. The methods of soil exploration, field tests on soil by planning and soil investigation report documentation.</li> <li>II. The stability of infinite and finite slopes using different parameters.</li> <li>III. The various earth pressure theories and stability of retaining walls.</li> <li>IV. The theoretical, field tests and bearing capacity of shallow, deep and well foundations.</li> </ol> <p><b>COURSE OUTCOMES:</b>  <b>After successful completion of the course, students will be able to</b></p> <p>CO 1 <b>Explain</b> the methods of soil exploration, sampling and boring for soil properties characterization used in substructures.</p> <p>CO 2 <b>List</b> out different penetration tests and plate load test used in the soil investigation for finding bearing capacity and settlement of soil.</p> <p>CO 3 <b>Summarize</b> the failures of finite and infinite slopes of soil for finding the factor of safety in slope construction.</p> <p>CO 4 <b>Outline</b> the basic concepts of stability of slopes of earthen dam for water confinement and storm water diversion.</p> <p>CO 5 <b>Classify</b> various earth pressure theories and stability of retaining walls for accretion of earth at different topological conditions.</p> <p>CO 6 <b>Identify</b> the bearing capacity of shallow foundation by different methods for construction of residential, public and industrial structures.</p> <p>CO 7 <b>Identify</b> the load carrying capacity and settlement of pile group for estimating bearing capacity in construction of highways and docks.</p> <p>CO 8 <b>Illustrate</b> different shapes and components for sinking appropriate well in construction of bridges and harbours</p> <p>CO 9 <b>Explain</b> different principles and IRC guide lines of well foundation for construction of railways and power plants.</p>								
<b>UNIT-I</b>	<b>SOIL EXPLORATION</b>						<b>Classes: 09</b>	
<p>Need and methods of soil exploration, boring and sampling methods, pits and trenches, drifts and shafts, methods of boring, auger borings, wash borings, rotary drilling, percussion drilling, core drilling, types of soil samples, disturbed samples, undisturbed samples, design features affecting the sample disturbance, split spoon samplers, scraper bucket samplers, shell by tubes and thin walled samplers, piston samplers, preservation and handling of samples. penetration tests, monotonic and cyclic, field permeability tests, in-situ tests using pressure meter, observation of ground water table, instrumentation in soil engineering, strain gauges, resistance and inductance type plate load test, pressuremeter, geophysical methods, planning of programme and preparation of soil investigation report.</p>								

<b>UNIT-II</b>	<b>SLOPE STABILITY</b>	<b>Classes: 09</b>
<p>Infinite and finite earth slopes, types of failures, factor of safety of infinite slopes, stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method, Taylor's Stability number, and stability of slopes of earth dams under different conditions.</p>		
<b>UNIT-III</b>	<b>EARTH PRESSURE THEORIES AND RETAINING WALLS</b>	<b>Classes: 09</b>
<p>Rankine's theory of earth pressure, earth pressures in layered soils, Coulomb's earth pressure theory, and Culmann's graphical method. Types of retaining walls, stability of retaining walls against overturning, sliding, bearing capacity and drainage from backfill.</p>		
<b>UNIT-IV</b>	<b>SHALLOW AND DEEP FOUNDATIONS</b>	<b>Classes: 09</b>
<p>Types, choice of foundation, location of depth, safe bearing capacity, Terzaghi, Meyerhof, Skempton and IS Methods. Safe bearing pressure based on N value, allowable bearing pressure, safe bearing capacity, plate load test, allowable settlements of structures, Analysis of foundation, individual, strip, combined footings and mat foundations conventional, elastic approach, soil structure interaction principles. Types of piles, load carrying capacity of piles based on static pile formulae in dynamic pile formulae, pile load tests, load carrying capacity of pile groups in sands and clays, settlement of pile groups. Introduction to foundations on expansive soils and marine foundations.</p>		
<b>UNIT-V</b>	<b>WELL FOUNDATIONS</b>	<b>Classes: 09</b>
<p>Different shapes of wells, components of well, sinking of well, tilts and shifts, principles of analysis and design, seismic influences, IRC guidelines</p>		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. Braja M. Das, "Principles of geotechnical engineering" Cengage Learning publishers, 2002</li> <li>2. V.N.S Murthy, "Geotechnical Engineering: Principles and practices of soils mechanics and foundation engineering", Taylor &amp; Francis Group, 2002.</li> <li>3. Gopal Ranjan and ASR Rao, "Basic and Applied Soil Mechanics", New age international Pvt. Ltd, New Delhi, 2000.</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. C. Venkataramiah, "Geotechnical engineering", New Age International Pvt. Ltd, 2002.</li> <li>2. Manoj Dutta and Gulati, "Geotechnical engineering", Tata McGraw Hill publishers New Delhi, 2005.</li> <li>3. K.R. Arora, "Soil mechanics and foundation engineering", standard publishers and distributors, New Delhi, 2005.</li> </ol>		
<b>Web References:</b>		
<ol style="list-style-type: none"> <li>1. <a href="http://nptel.ac.in/courses/105107120/1#">http://nptel.ac.in/courses/105107120/1#</a></li> <li>2. <a href="https://ocw.mit.edu/courses/civil_and_environmental_engineering/1.364/advanced_geotechnical_engineering_fall_2003/index.html">https://ocw.mit.edu/courses/civil_and_environmental_engineering/1.364/advanced_geotechnical_engineering_fall_2003/index.html</a></li> </ol>		