

## GEOTECHNICAL ENGINEERING

<b>VI Semester: CE</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACEB19	<b>CORE</b>	L	T	P	C	CIA	SEE	Total
		2	1	-	3	30	70	100
<b>Contact Classes: 30</b>		<b>Tutorial Classes: 15</b>		<b>Practical Classes: Nil</b>			<b>Total Classes: 45</b>	
<p><b>OBJECTIVES:</b> Students will try to learn:</p> <p>I        The fundamental knowledge on soils, importance in the design and construction process of massive structures</p> <p>II        The laboratory, field tests conducted on soils to identify the better ground to construction.</p> <p>III       The methods employed for soil properties prediction, soil layers and its applications.</p> <p>IV        The role of shear strength in load carrying capacity of soils, restored and durable structures.</p> <p><b>COURSE OUTCOMES</b> After successful completion of the course, students are be able to:</p> <p>CO 1    <b>Summarize</b> the various methods used to predict the soil properties for the suitability of the soil in shallow and deep foundations.</p> <p>CO 2    <b>Recall</b> types of soil per IS soil classification for Index and Engineering soil properties calculation.</p> <p>CO 3    <b>Explain</b> the concepts of permeability, seepage and ground water table for highways, airports, earthen dam construction.</p> <p>CO 4    <b>Illustrate</b> the total, geo- stress distribution for field conditions, for providing rough estimation of soil engineering properties.</p> <p>CO 5    <b>Recall</b> the behaviour of the soil in normal, over-consolidated and under-consolidated soils for the embankment, footings or column of clay soils.</p> <p>CO 6    <b>Examine</b> the importance of total, neutral and effective stress in load carrying capacity of soil for finding the compression rate in cohesion and cohesionless soils.</p> <p>CO 7    <b>Recognize</b> the importance of consolidation, compaction in settlement calculation &amp; compute the consolidation settlement especially in clayey soils to avoid uneven settlement in residential and commercial constructions.</p> <p>CO 8    <b>Test for</b> the shear strength of the soil by direct shearing and tri-axial testing under different drainage conditions for the inner capacity to resist shear failure.</p> <p>CO 9    <b>Interpret</b> failure criteria proposed by Mohr-coulomb and the soil shear parameters used for assessing the stability of the retaining walls, slopes and embankments.</p>								

<b>MODULE-I</b>	<b>INTRODUCTION AND INDEX PROPERTIES OF SOILS</b>	<b>Classes: 08</b>
Soil formation, clay mineralogy and soil structure, moisture content, weight-volume relationships, relative density. Grain size analysis, sieve analysis, principle of hydrometer method, consistency limits and indices, I.S. classification of soils.		
<b>MODULE-II</b>	<b>PERMEABILITY, EFFECTIVE STRESS AND SEEPAGE THROUGH SOILS</b>	<b>Classes: 10</b>
Capillary rise, flow of water through soils, Darcy's Law, permeability, factors affecting permeability, laboratory & field tests for determination of coefficient of permeability, permeability of layered soils; Total, neutral and effective stress, upward and downward seepage through soils, quick sand condition, flow nets: characteristics and uses.		
<b>MODULE-III</b>	<b>STRESS DISTRIBUTION IN SOILS &amp; COMPACTION</b>	<b>Classes: 09</b>
Boussinesq's and Westergard's theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along vertical and horizontal plane, Newmark's influence chart for irregular areas. Mechanism of compaction, factors affecting compaction, effects of compaction on soil properties, field compaction equipment and compaction quality control.		
<b>MODULE -IV</b>	<b>CONSOLIDATION</b>	<b>Classes: 10</b>
Types of compressibility, immediate settlement, primary consolidation and secondary consolidation, stress history of clay, e-p and e-logp curves, normally consolidated soil, over and under consolidated soil, pre-consolidation pressure and its determination, Terzaghi's 1-D consolidation theory, coefficient of consolidation square root time and logarithm of time fitting methods, computation of total settlement and time rate of settlement.		
<b>MODULE -V</b>	<b>SHEAR STRENGTH OF SOILS</b>	<b>Classes: 08</b>
Importance of shear strength, mohr and coulomb failure theories, types of laboratory tests for strength parameters, strength tests based on drainage conditions, strength envelopes, shear strength of sands, dilatancy, critical void ratio, liquefaction, shear strength of clays.		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. BrajaM. Das, "Principles of geotechnical engineering" Cengage learning publishers,2002</li> <li>2. VNS Murthy, "Soil mechanics and foundation engineering", CBS publishers and distributors,2003.</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 Mc Grawhill publishers New Delhi,2005.</li> <li>3. K.R .Arora, "Soil mechanics and foundation engineering", standard publishers and distributors, New Delhi,2005.</li> <li>4. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Soil mechanics and foundation", Laxmi publications Pvt. Ltd, 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="http://www.nptel.ac.in/courses/105105105/">http://www.nptel.ac.in/courses/105105105/</a></li> </ol>		