

<p align="center">Course Title: Applied Geotechnical Engineering [As per Choice Based Credit System (CBCS) scheme] SEMESTER:V</p>			
Subject Code	15CV53	IA Marks	20
Number of Lecture Hours/Week	04	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03
CREDITS – 04		Total Marks-100	
<p>Course objectives: This course will enable students to</p> <ol style="list-style-type: none"> 1. Appreciate basic concepts of soil mechanics as an integral part in the knowledge of Civil Engineering. Also to become familiar with foundation engineering terminology and understand how the principles of Geotechnology are applied in the design of foundations 2. Learn introductory concepts of Geotechnical investigations required for civil engineering projects emphasizing in-situ investigations 3. Conceptually learn various theories related to bearing capacity of soil and their application in the design of shallow foundations and estimation of load carrying capacity of pile foundation 4. Estimate internal stresses in the soil mass and application of this knowledge in proportioning of shallow and deep foundation fulfilling settlement criteria 5. Study about assessing stability of slopes and earth pressure on rigid retaining structures 			
Modules		Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1			
<p>Soil Exploration: Introduction, Objectives and Importance, Stages and Methods of exploration- Test pits, Borings, Geophysical methods, stabilization of boreholes, Sampling techniques, Undisturbed, disturbed and representative samples, Geophysical exploration and Bore hole log. Drainage and Dewatering methods, estimation of depth of GWT (Hvorslev's method).</p>		10 Hours	L1,L2,L3
Module -2			
<p>Stress in Soils: Introduction, Boussinesq's and Westergaard's theory - concentrated load, circular and rectangular load, equivalent point load method, pressure distribution diagrams and contact pressure, Newmark's chart</p> <p>Foundation Settlement - Approximate method for stress distribution on a horizontal plane, Types of settlements and importance, Computation of immediate and consolidation settlement</p>		10 Hours	L2,L3,L4
Module -3			
<p>Lateral Earth Pressure: Active, Passive and earth pressure at rest, Rankine's theory for cohesionless and cohesive soils, Coulomb's theory, Rebhann's and Culmann's graphical construction.</p> <p>Stability of Slopes : Assumptions, infinite and finite slopes, factor of safety, use of Taylor's stability charts, Swedish slip circle method for C and C-ϕ (Method of slices) soils, Felineous method for critical slip circle</p>		10 Hours	L2,L4,L5

Module -4		
Bearing Capacity of Shallow Foundation: Types of foundations, determination of bearing capacity by Terzaghi's and BIS method (IS: 6403), Effect of water table and eccentricity, field methods - plate load test and SPT Proportioning of shallow foundations- isolated and combined footings (only two columns)	10 Hours	L2,L4,L5,L6
Module -5		
Pile Foundations: Types and classification of piles, single loaded pile capacity in cohesionless and cohesive soils by static formula, efficiency of pile group, group capacity of piles in cohesionless and cohesive soils, negative skin friction, pile load tests, Settlement of piles, under reamed piles (only introductory concepts – no derivation)	10 Hours	L2,L3,L4
<p>Course outcomes: On the completion of this course students are expected to attain the following outcomes;</p> <ol style="list-style-type: none"> 1. Ability to plan and execute geotechnical site investigation program for different civil engineering projects 2. Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils 3. Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures 4. Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure 5. Capable of estimating load carrying capacity of single and group of piles 		
<p>Program Objectives</p> <ul style="list-style-type: none"> • Engineering knowledge • Problem analysis • Interpretation of data 		
<p>Question paper pattern:</p> <ul style="list-style-type: none"> • The question paper will have ten questions. • Each full question consists of 16 marks. • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module. • Use of IS: 6403 shall be permitted. 		
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Gopal Ranjan and Rao A.S.R., Basic and Applied Soil Mechanics, New Age International (P) Ltd., New Delhi. 2. Punmia B C, Soil Mechanics and Foundation Engineering, Laxmi Publications co., New Delhi. 3. Murthy V.N.S., Principles of Soil Mechanics and Foundation Engineering, UBS Publishers and Distributors, New Delhi. 4. Braja, M. Das, Geotechnical Engineering; Thomson Business Information India (P) Ltd., India 		

Reference Books:

1. T.W. Lambe and R.V. Whitman, Soil Mechanics-, John Wiley & Sons
2. Donald P Coduto, Geotechnical Engineering- Phi Learning Private Limited, New Delhi
3. Shashi K. Gulathi & Manoj Datta, Geotechnical Engineering-. , Tata McGraw Hill Publications
4. Debashis Moitra, “Geotechnical Engineering” , Universities Press.,
5. Malcolm D Bolton, “ A Guide to soil mechanics”, Universities Press.,
6. Bowles J E , Foundation analysis and design, McGraw- Hill Publications