

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
ADICHUNCHANAGIRI UNIVERSITY
BGS Institute of Technology

B. E. CIVIL ENGINEERING
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)

18CV54	Course Code	GEOTECHNICAL ENGINEERING	Course Title	V	Semester
4	Credits	3 – 1 – 0 – 4	L – T – P – TL*	50 Hours	Teaching Period
100 Marks	Total	60 Marks	SEE*	40 Marks	CIE*
*NOTE: L – Lecture; T – Tutorial; P – Practical; TL – Total; CIE – Continuous Internal Evaluation; SEE – Semester End Examination					

<p>Course Learning Objectives: This course will enable students to</p> <ol style="list-style-type: none"> To appreciate basic concepts of soil mechanics as an integral part in the knowledge of civil engineering. Also to become familiar broadly with geotechnical engineering problems such as foundation engineering, flow of water through soil medium and terminologies associated with geotechnical engineering. To know the basic engineering properties and the mechanical behavior of different types of soil. This includes strength deformation characteristics under shearing stresses. To determine the improvement in mechanical behavior by densification of soil deposit using compaction. Learn introductory concepts of geotechnical investigations required for civil engineering projects emphasizing in situ investigation. Conceptually learn various theories related to earth pressure and bearing capacity of soil and their application in the design of foundations. 	Teaching Hours
<p>Module-1 Introduction: Introduction, Origin and formation of soil, Phase diagram, Phase relationships, Definitions and their inter relationships, Determination of index properties: Specific gravity, Water content, In-situ density and Particle size analysis (sieve and sedimentation analysis), Atterberg’s limits, Consistency indices, Relative density, Unified soil classification system, Indian standard classification system, Numerical problems.</p>	10 Hours
<p>Module-2 Compaction of Soils: Definition, Principle of compaction, Standard and Modified proctor’s compaction tests, Factors affecting compaction, Effect of compaction on soil properties, Field compaction methods, Field compaction control, Numerical problems. Permeability: Introduction, Darcy’s Law, Factors affecting permeability, Coefficient of absolute permeability, Determination of coefficient of permeability, Field methods, Permeability of stratified soil deposit, Numerical problems.</p>	10 Hours

<p>Module-3 Shear Strength of Soil: Introduction, Mohr's stress circle, Mohr-coulomb failure theory, Effective stress principle, Measurement of shear strength: Direct shear test, Triaxial shear test, Unconfined compression test, Vane shear test, Test under different drainage conditions, Numerical problems.</p>	10 Hours
<p>Module-4 Soil Exploration: Introduction, Objectives, Methods of exploration, Types of samples, Types of samplers, Sample disturbance, Bore hole log, Depth of boring, Penetrometer Test, Drainage and dewatering: methods, estimation of depth of GWT (Hvorslev's method), Numerical problems.</p>	10 Hours
<p>Module-5 Lateral Earth Pressure: Introduction, Plastic equilibrium in soils, Earth pressure theories: Rankine's theory, Coulomb's theory, Rebhann's and Culmann's graphical construction, Numerical problems. Bearing Capacity: Introduction, Definitions, Types of bearing capacity failures, Terzaghi's bearing capacity equations, Effect of ground water table on bearing capacity, Eccentric loading, Factors affecting, Field methods, Numerical Problems.</p>	10 Hours
<p>Course Outcomes: After studying this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the basic definitions regarding the soils and their classification based on their index properties of soils. 2. Understand the principle of compaction and its control and compute the permeability of soils. 3. Understand the concepts of shear strength of soils and able to calculate the shear strength parameters by using various methods. 4. Understand the methods of soil exploration techniques and able to examine the properties of soil for different civil engineering projects. 5. Will be able to analyze and determine the lateral earth pressure distribution and bearing capacity of soil under different types of foundations. 	
<p>Question paper pattern:</p> <ul style="list-style-type: none"> • The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub- questions) from each module. • Each full question will have sub- question covering all the topics under a module. • The students will have to answer five full questions, selecting one full question from each module. 	
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Punmia B C, "Soil Mechanics and Foundations", Laxmi Publications (P) Ltd. 2. Murthy V N S, "Principles of Soil Mechanics and Foundation Engineering", UBS Publishers and Distributors, New Delhi. 3. Gopal Ranjan and Rao A S R, "Basic and Applied Soil Mechanics", New Age International (P) Ltd, New Delhi. 	
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. T W Lambe and R V Whitman, "Soil Mechanics". 2. Donald P Coduto, "Geotechnical Engineering", Phi Learning Private Limited, New Delhi. 	