

FOUNDATION ENGINEERING

VIII Semester: CE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACE018	Core	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
Contact Classes: 45		Tutorial Classes: Nil		Practical Classes: Nil			Total Classes: 45	
<p>OBJECTIVES:</p> <p>The course should enable the students to:</p> <ol style="list-style-type: none"> I. Understand various methods of soil exploration and field tests on soil, planning and preparation of soil investigation programme. II. Analyze the stability of infinite and finite slopes III. Calculate At rest, Active and Passive earth pressures of soil & analyze the stability of retaining wall against sliding, overturning and bearing capacity failures. IV. Calculate the bearing capacity of shallow and deep foundation from theoretical & field tests. <p>COURSE OUTCOMES (COs):</p> <p>CO 1 Understand the need and various methods of soil exploration, planning and preparation of soil investigation report</p> <p>CO 2 Analyze the stability of slopes by various methods</p> <p>CO 3 Understand various earth pressure theories and stability of retaining walls at various conditions</p> <p>CO 4 Understand shallow and deep foundations according to various bearing capacity theories and analyze Pile foundations in various different soils</p> <p>CO 5 Understand various shapes and components of wells and analyze, design according to IRC guidelines</p> <p>COURSE LEARNING OUTCOMES (CLOs):</p> <p>At the end of the course, the student will have the ability to:</p> <ol style="list-style-type: none"> 1. Understand the need and methods of Soil Exploration 2. Understand various methods of sampling and boring 3. Learn how to perform field tests such as SPT, DCPT, CPT 4. Learn how to perform Plate Load test for finding load bearing capacity, settlements of soils 5. Learn how to perform in-situ test using pressure meter 6. Understand the importance of geophysical methods 7. Learn how to prepare Soil investigation Report 8. Understand basic concepts of earth slopes 9. Analyze failure of infinite slopes 10. Analyze types of failures for finite slopes 11. Learn how to find Stability of slopes by Swedish arc Method 12. Learn how to find Stability of slopes by Method of Slices for slopes 13. Find Stability of slopes by Taylor's Stability number 14. Understand basic concepts of Stability of slopes of earth dam under different conditions 15. Understand concepts of earth pressure theories for stability of Retaining walls 16. Calculate active and passive earth pressures from Rankine's earth pressure theories 17. Calculate active and passive earth pressures from Coulomb's & Culmann's Method 18. Assess the stability of retaining wall against overturning, sliding, bearing capacity 19. Understand the concepts of safe bearing capacity, ultimate bearing capacity etc., 20. Calculate the bearing capacity of shallow foundation using Terzaghi, Meyerhof, Skempton and IS Methods. 								

<p>21. Calculate the load carrying capacity of pile using static, dynamic pile formula and pile load test</p> <p>22. Calculate load carrying capacity of pile group in sands and clay & settlement of pile group</p> <p>23. Learn different shapes of well & components of Well foundation</p> <p>24. Understand the principle of analysis and design of wells, Seismic analysis and IRC guidelines</p>		
UNIT-I	SOIL EXPLORATION	Classes: 09
<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, pressure meter, geophysical methods, planning of programme and preparation of soil investigation report.</p>		
UNIT-II	SLOPE STABILITY	Classes: 09
<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>		
UNIT-III	EARTH PRESSURE THEORIES AND RETAINING WALLS	Classes: 09
<p>Rankine's theory of earth pressure, earth pressures in layered soils, Coulomb's earth pressure theory, and Culmann's graphical method.</p> <p>Types of retaining walls, stability of retaining walls against overturning, sliding, bearing capacity and drainage from backfill.</p>		
UNIT-IV	SHALLOW AND DEEP FOUNDATIONS	Classes: 09
<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>		
UNIT-V	WELL FOUNDATIONS	Classes: 09
<p>Different shapes of wells, components of well, sinking of well, tilts and shifts, principles of analysis and design, seismic influences, IRC guidelines</p>		
<p>Text Books:</p>		
<ol style="list-style-type: none"> 1. Braja M. Das, "Principles of geotechnical engineering" Cengage learning publishers, 2002 2. V.N.S Murthy, "Geotechnical Engineering: Principles and practices of soils mechanics and foundation engineering", Taylor & Francis Group, 2002. 3. Gopal Ranjan and ASR Rao, "Basic and Applied Soil Mechanics", New age international Pvt. Ltd, New Delhi, 2000. 		

Reference Books:

1. C. Venkataramiah, "Geotechnical engineering", New Age International Pvt. Ltd, 2002.
2. Manoj Dutta and Gulati, "Geotechnical engineering", Tata Mc Grawhill publishers New Delhi, 2005.
3. K.R .Arora, "Soil mechanics and foundation engineering", standard publishers and distributors, New Delhi, 2005.

Web References:

1. <http://nptel.ac.in/courses/105107120/1#>
2. <https://ocw.mit.edu/courses/civil,and,environmental,engineering/1,364,advanced,geotechnical,engineering,fall,2003/index.html>