SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

Department of CIVIL ENGINEERING		LP: CE18403
B.E/B.Tech/M.E/M.Tech : CIVIL ENGINEERING	Regulation:2018	Rev. No: 00
PG Specialisation : NA		Date: 01.03.2022
Sub. Code / Sub. Name : CE18403 BASIC GEOTECHNICAL ENGINEERING		
Unit : I		

Unit Syllabus: **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 (dry sieve and sedimentation analysis) Atterberg's Limits, consistency indices, relative density, activity of clay, Unified and BIS soil classification

Objective:

To impart the knowledge about Soil Classification, phase relationship particle size analysis of soil and Unified and BIS soil classification.

Session No *	Topics to be covered	Ref	Teaching Aids
1	Introduction, origin and formation of soil	T-3, Ch 1, Pg 4-7	BB
2	Phase relation, basic definitions, three and two phase diagrams	T-3, Ch 2, Pg 13-20	BB
3	Phase relation, basic definitions, three and two phase diagrams	T-3, Ch 2, Pg 13-20	BB
4	Inter relationship of various properties and problem solving	Ref-2, Ch 4, Pg 107-112	BB
5	Inter relationship of various properties and problem solving	Ref-2, Ch 4, Pg 107-112	BB
6	Various laboratory methods to determine index properties of soil	T-3, Ch 2, Pg 26-37	BB
7	Atterberg limits definition, Various types of index, and their importance – UCS classification of soil	Ref 4, Ch 4, Pg 115-120	BB
8	Atterberg limits definition, Various types of index, and their importance – UCS classification of soil	Ref 4, Ch 4, Pg 115-120	BB
9	BIS Classification of soil and related numerical problems	Ref 4, Ch 4, Pg 120-125	BB

Content beyond syllabus covered (if any):

* Session duration: 50 minutes

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Sub. Code / Sub. Name: : CE 18403 BASIC GEOTECHNICAL ENGINEERING
Unit : II

Unit Syllabus : **SOIL STRUCTURE AND CLAY MINERALOGY**

Single grained, honey combed, flocculent and dispersed structures, Soil-Water system, Electrical diffuse double layer, adsorbed water, Common clay minerals in soil and their structures - Kaolinite, Illite and Montmorillonite and their application in Engineering 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 control - compactive effort & method of compaction, lift thickness and number of passes.

Objective:

To impart the knowledge on soil structure, clay mineralogy of soil and also about compaction of soil. At the end of this unit, students will be able to understand the different structure of clay and compaction characteristics of clay.

Session No *	Topics to be covered	Ref	Teaching Aids
10	Single grained, honey combed, flocculent and dispersed structures	T-2, Ch 4, Pg 96-97	BB/PPT
11	Soil-Water system, Electrical diffuse double layer, adsorbed water	T-2, Ch 4, Pg 92-95	BB/PPT
12	Common clay minerals in soil and their structures - Kaolinite, Illite and Montmorillonite and their application in Engineering	T-2, Ch 4, Pg 86-92	BB/PPT
13	Compaction of Soils: Definition, Principle of compaction	T-3, Ch 14, Pg 357-363	BB/PPT
14	Standard and Modified proctor's compaction tests	T-3, Ch 14, Pg 357-363	BB/PPT
	CAT 1		
15	factors affecting compaction	T-3, Ch 14, Pg 357-363	BB/PPT
16	effect of compaction on soil properties	T-3, Ch 14, Pg 357-363	BB/PPT
17	Field compaction control - compactive effort & method of compaction, lift thickness and number of passes	T-3, Ch 14, Pg 357-363	BB/PPT
18	Field compaction control - compactive effort & method of compaction, lift thickness and number of passes	T-3, Ch 14, Pg 357-363	BB/PPT

Content beyond syllabus covered (if any):

* Session duration: **50 mins**

Sub. Code / Sub. Name: : CE 18403 BASIC GEOTECHNICAL ENGINEERING
Unit : III

Unit Syllabus : **EFFECTIVE STRESS AND FLOW THROUGH SOILS**

    Effective Stress Analysis: Geostatic stresses, Effective stress concept-total stress, effective stress and Neutral stress and impact of the effective stress in construction of structures, effect of capillarity quick sand phenomena Seepage Analysis: Darcy"s law- assumption and validity, coefficient of permeability and its determination (laboratory and field), factors affecting permeability, permeability of stratified soils, Seepage velocity, superficial velocity and coefficient of percolation, Capillary Phenomena Laplace equation, assumptions, limitations and its derivation. Flow nets-characteristics and applications. Flow nets for sheet piles and below the dam section.

Objective:

    To impart the knowledge on seepage and permeability characteristics of soil. At the end of this unit, students will be able to compute the permeability coefficient of a soil type and its seepage pressure.

Session No *	Topics to be covered	Ref	Teaching Aids
19	Effective Stress Analysis: Geostatic stresses, Effective stress concept-total stress	T-1, Ch 8,Pg 197-202	BB
20	Effective stress and Neutral stress	T-1, Ch 8,Pg 197-202	BB
21	Impact of the effective stress in construction of structures, effect of capillarity quick sand phenomena	T-1, Ch 8,Pg 197-202	BB
22	Seepage Analysis: Darcy"s law- assumption and validity	Ref 6, Ch 4, Pg 221-225	BB
23	coefficient of permeability and its determination (laboratory and field), factors affecting permeability, permeability of stratified soils	T-1, Ch 6,Pg 155-158	BB
24	Seepage velocity, superficial velocity and coefficient of percolation	T-1, Ch 7,Pg 168-173	BB
25	Capillary Phenomena Laplace equation, assumptions, limitations and its derivation	T-1, Ch 7,Pg 168-173	BB
26	Flow nets- characteristics and applications	Ref 6, Ch 5, Pg 240-250	BB
27	Flow nets for sheet piles and below the dam section.	Ref 6, Ch 5, Pg 240-250	BB
	CAT 2		
Content beyond syllabus covered (if any):			

* Session duration: 50 mins

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Sub. Code / Sub. Name: CE 18403 BASIC GEOTECHNICAL ENGINEERING
Unit : IV

Unit Syllabus : **CONSOLIDATION OF SOIL**

Definition, Mass-spring analogy, Terzaghi"s one dimensional consolidation theory – assumption and limitations. Derivation of Governing differential Equation, Pre-consolidation pressure and its determination by Casagrande"s method. Over consolidation ratio, normally consolidated, under consolidated and over consolidated soils. Consolidation characteristics of soil (Cc, av, mv and Cv. Laboratory one dimensional consolidation test, characteristics of e-log(σ'') curve, Determination of consolidation characteristics of soils- compression index and coefficient of consolidation (square root of time fitting method, logarithmic time fitting method). Primary and secondary consolidation.

Objective:

To impart the knowledge on stress distribution in a soil media due to various types of loading and compressibility nature of soil. At the end of this course the students will be to calculate the stress at a point and also determine the settlement characteristics of the soil.

Session No *	Topics to be covered	Ref	Teaching Aids
28	Definition, Mass-spring analogy, Terzaghi"s one dimensional consolidation theory	T-1, Ch 11, Pg 303-311	BB/PPT
29	Pre-consolidation pressure and its determination by Casagrande"s method	T-1, Ch 11, Pg 303-311	BB/PPT
30	Over consolidation ratio, normally consolidated, under consolidated and over consolidated soils	T-1, Ch 11, Pg 303-311	BB/PPT
31	Consolidation characteristics of soil (Cc, av, mv and Cv)	T-1, Ch 11, Pg 303-311	BB
32	Laboratory one dimensional consolidation test, characteristics of e-log(σ'') curve	Ref-3, Ch 10, Pg 292-297	BB
33	Determination of consolidation characteristics of soils	Ref-3, Ch 10, Pg 292-297	BB
34	compression index and coefficient of consolidation (square root of time fitting method)	Ref-3, Ch 10, Pg 292-297	BB
35	compression index and coefficient of consolidation (Logarithmic time fitting method)	Ref-3, Ch 10, Pg 292-297	BB
36	Primary and secondary consolidation	T-1, Ch 11, Pg 293-298	BB

Content beyond syllabus covered (if any):

* Session duration: 50 mins

Sub. Code / Sub. Name: CE 18403 BASIC GEOTECHNICAL ENGINEERING
Unit : V

Unit Syllabus : **SHEAR STRENGTH OF SOIL**

Concept of shear strength, Mohr–Coulomb Failure Criterion, Concept of pore pressure, Total and effective shear strength parameters, factors affecting shear strength of soils. Thixotrophy and sensitivity Measurement of shear strength parameters - Direct shear test, unconfined compression test, triaxial compression test and field Vane shear test, Total and effective stress paths.

Objective:

To impart the knowledge on shear strength behavior of soil. At the end of this course the students will be aware of various tests to determine the shear strength characteristics of soil medium.

Session No *	Topics to be covered	Ref	Teaching Aids
37	Concept of shear strength	T-2, Ch 10, Pg 287-290	BB/PPT
38	Mohr–Coulomb Failure Criterion	T-2, Ch 10, Pg 291-296	BB
39	Concept of pore pressure, Total and effective shear strength parameters	T-2, Ch 10, Pg 291-296	BB
40	Factors affecting shear strength of soils	T-2, Ch 10, Pg 287-290	BB
41	Thixotrophy and sensitivity Measurement of shear strength parameters	Ref-6, Ch 4, Pg 94-99	BB
42	Direct shear test, unconfined compression test	Ref-6, Ch 4, Pg 94-99	BB/PPT
43	triaxial compression test	T-2, Ch 10, Pg 297-300	BB/PPT
44	field Vane shear test	T-2, Ch 10, Pg 300-303	BB/PPT
45	Total and effective stress paths	T-2, Ch 10, Pg 324-328	BB
	CAT 3		

Content beyond syllabus covered (if any):

Methods to Improve the Stability of Slope

* Session duration: 50 mins

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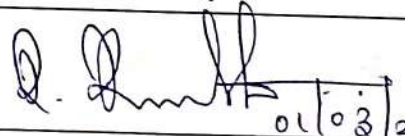Sub. Code / Sub. Name: CE 18403 BASIC GEOTECHNICAL ENGINEERING

TEXT BOOKS:

1. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers and Distributers Ltd., New Delhi, 2007.
2. Gopal Ranjan and Rao A.S.R. "Basic and Applied soil mechanics", New Age International Pvt. Ltd, New Delhi, 2005.
3. Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2002.

REFERENCES:

1. McCarthy D.F. "Essentials of Soil Mechanics and Foundations". Prentice-Hall, 2002.
2. Coduto, D.P. "Geotechnical Engineering – Principles and Practices", Prentice Hall of India Pvt.Ltd, New Delhi, 2002.
3. Das, B.M. "Principles of Geotechnical Engineering". Thompson Brooks / Coles Learning Singapore, 5th Edition, 2002.
4. Punmia, B.C. "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., New Delhi, 2005. 5. Palanikumar. M, "Soil Mechanics", Prentice Hall of India Pvt. Ltd, Leaning Private Limited, Delhi, 2013.
5. Craig. R.F., "Soil Mechanics". E & FN Spon, London and New York, 2007
6. Purushothama Raj. P., "Soil Mechanics and Foundation Engineering",2nd Edition, Pearson Education, 2013

	Prepared by	Approved by
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Designation	Assistant Professor	Professor and Head
Date	01.03.2022	01 03 22
Remarks *:		
Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD