

Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Civil Engineering

BCE 403 SOIL MECHANICS
Fourth Semester, 2016-17 (Even Semester)

Course (catalog) description

To impart knowledge on behavior and the performance of saturated soil. To understand and access both physical and engineering behavior of soils, mechanism of stress transfer in two-phase systems and stability analysis of slopes

Compulsory/Elective course : Compulsory for Civil students

Credit/ Contact hours : 4 credits / 45hours

Course Coordinator : Mr. P. Dayakar, Associate Professor

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain: @bharathuniv.ac.in)	Consultation
Mr. P. Dayakar	Second year Civil	Civil Block			9.50 – 10.40 AM
Ms. T. Aarthy Harini	Second year Civil	Civil Block			2.20 – 3.10 PM

Relationship to other courses:

Pre –requisites : BCE 302 Surveying 1
Assumed knowledge : -
Following courses : BCE503 Foundation Engineering

Syllabus Contents

UNIT I INTRODUCTION	10
Nature of soil - Soil description and classification for engineering purposes - IS Classification system – Phase relationships - Soil compaction - Theory, comparison of laboratory and field compaction methods – Ground improvements by compaction.	
UNIT II SOIL WATER AND WATER FLOW	8
Soil water - static pressure in water - Permeability measurement in the laboratory and field - Seepage - Introduction to flow nets - Simple problems.	
UNIT III STRESS DISTRIBUTION AND SETTLEMENT	9
Effective stress concepts in solids - Stress distribution in soil media - Use of influence charts - Components of settlement - Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory.	
UNIT IV SHEAR STRENGTH	9
Shear strength of cohesive and cohesion less soils - Mohr - Coulomb failure theory - saturated soil mass - Measurement of shear strength - direct shear - triaxial compression, UCC and Vane shear tests - Pore pressure parameters.	
UNIT V SLOPE STABILITY	9

Slope failure mechanisms - Types - Infinite slopes - Finite slopes - Total stress analysis for saturated clay - Method of slices - friction circle method - Use of stability number - Slope protection measures.

TEXT BOOKS:

1. Punmia P.C., "Soil Mechanics and Foundations ", Laxmi Publications Pvt. Ltd., New Delhi 2005

REFERENCE:

1. Holtz R.D. and Kovacs W.D., "Introduction to Geotechnical Engineering ", Prentice-Hall, 1995.
2. McCarthy P.D.F., "Essentials of Soil Mechanics and Foundations ", Prentice-Hall, 1973.
3. Suttan B.H.C., "Solving Problems in Soil Mechanics", Longman Group Scientific and Technical, U.K.England, 1994.
4. Khan I.H., "A text book of Geotechnical Engineering ", Prentice Hall of India, New Delhi, 1999.
5. Arora K.R., "Soil Mechanics and Foundation Engineering ", Standard Publishers and Distributors, New Delhi, 1997.

Computer usage: Nil

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area:

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 1 st week	Session 1 to 14	2 Periods
2	Cycle Test-2	March 2 nd week	Session 15 to 28	2 Periods
3	Model Test	April 2 nd week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

	Correlates to program outcome		
	H	M	L
1. To study about different materials used in masonry	d	b	-
2. To analyse the steel structures.	a,d	e	-
3. To design of trusses and their members.	d	-	-
4. To carry out the analysis of simple beams	-	a,d	-
5. To study about different loading conditions on trusses	d	b	-

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I INTRODUCTION			
1.	Nature of soil	NO	T1/R1
2.	Soil description	NO	
3.	classification for engineering purposes	NO	
4.	IS Classification system	NO	
5.	Phase relationships	NO	
6.	Soil compaction	YES	
7.	Theory explanatiions	NO	
8.	comparison of laboratory	YES	
9.	field compaction methods	YES	
10.	Ground improvements by compaction	YES	
UNIT II SOIL WATER AND WATER FLOW			
11.	Soil water	YES	T1/R1
12.	static pressure in water	YES	
13.	Permeability measurement	YES	
14.	laboratory and field	YES	
15.	Seepage	YES	
16.	Introduction to flow nets	YES	
17.	Simple problems	YES	
UNIT III STRESS DISTRIBUTION AND SETTLEMENT			
18.	Effective stress concepts in solids	YES	T1/R1
19.	Stress distribution in soil media	YES	
20.	Use of influence charts	YES	
21.	Applications	YES	
22.	Components of settlement	YES	
23.	Immediate settlement	YES	
24.	consolidation settlement	YES	
25.	Terzaghi's one dimensional consolidation theory	YES	
26.	Detailed concepts	YES	
UNIT IV SHEAR STRENGTH			
27.	Shear strength of cohesive soils	YES	T1/R1
28.	Shear strength of cohesion less soils	YES	
29.	Mohr - Coulomb failure theory	YES	
30.	saturated soil mass	YES	
31.	Measurement of shear strength	YES	
32.	direct shear	YES	
33.	triaxial compression	YES	
34.	UCC	YES	
35.	Vane shear tests	YES	
36.	Pore pressure parameters	YES	
UNIT V SLOPE STABILITY			
37.	Slope failure mechanisms	YES	T1/R1
38.	Types	YES	
39.	Infinite slopes	YES	
40.	Finite slopes	YES	
41.	Total stress analysis for saturated clay	YES	
42.	Method of slices	YES	
43.	friction circle method	YES	
44.	Use of stability number	YES	
45.	Slope protection measures	YES	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	5%
Attendance	-	10%
Assignment	-	5%
Final exam	-	70%

Prepared by:Mr. P. Dayakar, Associate Professor , Department of Civil

Dated :

Addendum

ABET Outcomes expected of graduates of B.Tech / Civil/ program by the time that they graduate:

- a. An ability to apply knowledge of mathematics, science, and engineering
- b. An ability to design and conduct experiments, as well as to analyze and interpret data
- c. An ability to design a hardware and software system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. An ability to function on multidisciplinary teams
- e. An ability to identify, formulate, and solve engineering problems
- f. An understanding of professional and ethical responsibility
- g. An ability to communicate effectively
- h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i. A recognition of the need for, and an ability to engage in life-long learning
- j. A knowledge of contemporary issues
- k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives

PEO1: PREPARATION

Civil Engineering graduates will have knowledge to apply the fundamental principles for a successful profession and/or for higher education in Civil Engineering based on mathematical, scientific and engineering principles, to solve realistic and field problems that arise in engineering and non engineering sectors

PEO2: CORE COMPETENCE

Civil Engineering graduates will adapt to the modern engineering tools and construction methods for planning, design, execution and maintenance of works with sustainable development in their profession.

PEO3: PROFESSIONALISM

Civil Engineering Graduates will exhibit professionalism, ethical attitude, communication and managerial skills, successful team work in various private and government organizations both at the national and international level in their profession and adapt to current trends with lifelong learning.

PEO4: SKILL

Civil Engineering graduates will be trained for developing soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS

Civil Engineering graduates will be installed with ethical feeling, encouraged to make decisions that are safe and environmentally-responsible and also innovative for societal improvement.

Course Teacher	Signature
Mr. P. Dayakar	
Ms. T. Aarthi Harini	

Course Coordinator

HOD/Civil