Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Civil Engineering

BEC078 - STRUCTURES ON EXPANSIVE SOIL

Eighth Semester, 2016-17 (Even Semester)

Course (catalog) description

To understand the dynamics of earth and to estimate dynamic properties of soils To develop the site specific design spectrum for design of sub structure and evaluation of liquefaction potential. To design these structures in expansive soil To study the effectiveness of some supper structure resting on treated expansive soil Factors influencing mechanisms in expansive soils

Compulsory/Elective course **:** Compulsory for Civil students

Credit hours : 3 credits

Course Coordinator : Dr. R. Venkata Krishnaiah, Assistant Professor

Instructors **:**

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Dr. R. Venkata Krishnaiah	**IV Year civil**	**Civil Block**	**04422290742**		9.00 - 9.50 AM
P.Dayaker	**IV Year civil**	**Civil Block**	**04422290742**	dayakarpitti@yahoo.co.in	12.45 - 1.15 PM

Relationship to other courses:

Pre –requisites **:** Soil Mechanics
Assumed knowledge : Basic knowledge in soil mechanics
Following courses : Structures on Expansive soil, Soil Dynamics and machine Foundation

Syllabus Contents

UNIT I

GEOTECHNICAL PROBLEM **9 HOURS**

Occurrence and distribution - moisture equilibrium - Soil, structure, environmental interaction-distress symptoms - case histories.

UNIT II **9 HOURS**

EXPANSIVE SOIL PROPERTIES

Clay mineralogy - swell potential - field exploration - laboratory tests for identification

UNIT III **9 HOURS**

SOIL HEAVING

Heave Prediction - Method of prediction of heave- Empirical methods - double of dometer tests - soil moisture suction - field observations, shrinkage

UNIT IV **9 HOURS**

DESIGN OF FOOTING

Foundation Design – Design consideration – individual and continuous footings- stiffened matsunderreamed piles- codal provisions.

UNIT V

STABILIZATION **9 HOURS**

Stabilization methods

TEXT BOOKS:

1. John .D.N & Debora .J.M, "Expansive Soils Problems And Practice In Foundation & Pavement Engineering", J. Wiley, 1992.

REFERENCES:

1.Satish Grower, The Architecture of India, Buddist, Hindu Period and Islamic Period Vikas Publishing HousPvt Ltd., New Delhi, 1984. Chen F.R," Foundation on Expansive Soils", Elseivier ,1973.

2. Parcher J.V & Means R.E, Soil Mechanics & Foundation, Columbus, 1968. Perkk R.E., Hansen W.E, Thombum T.H, "Foundation Engineering", John Wiley, 1974

3. Kameswarao N.S.V," Dynamic Soil Test & Applications", Wheeler Publishing Co., 2002

Computer usage: Nil

Professional component

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

Broad area: Design of soil properties and design of footing

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February1st week	Session 1 to 14	2 Periods
2	Cycle Test-2	March 2nd week	Session 15 to 28	2 Periods
3	Model Test	April 2nd week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

To understand the dynamics of earth and to estimate dynamic properties of soils To develop the site specific design spectrum for design of sub structure and evaluation of liquefaction potential. To design these structures in expansive soil To study the effectiveness of some supper structure resting on treated expansive soil Factors influencing mechanisms in expansive soils	Correlates to program outcome		
	H	**M**	**L**
1. To understand the dynamics of earth and to estimate dynamic properties of soils	a,d	b,e	c
2. To improve the engineering properties and make it suitable for construction	a,c	b,d,e	
3.The engineering properties, problems and solution need to be considered when constructing a foundation on expansive soils.	d	a,b,e	c
4. To develop the site specific design spectrum for design of sub structure and evaluation of liquefaction potential..	a,b,d	c,d	
5. To study the behaviour of the stabilized soil subjected to cyclic loading	a,b,c,d		

H- High correlation, M- Medium Correlation, L- Low correlation

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I GEOTECHNICAL PROBLEM			
1.	Occurrence and distribution	No	[T1] -1 & R[1]
2.	Occurrence and distribution	No	
3.	Occurrence and distribution	No	
4.	moisture equilibrium	No	
5.	moisture equilibrium	No	
6.	Soil, structure	No	
7.	environmental interaction	No	
8.	distress symptoms	yes	
9.	case histories	Yes	
UNIT II EXPANSIVE SOIL PROPERTIES			
10.	Clay mineralogy	No	[T1] -1 & R[1]
11.	Clay mineralogy	No	
12.	Clay mineralogy	No	
13.	Clay mineralogy	No	
14.	swell potential	No	
15.	field exploration	No	
16.	laboratory tests for identification	No	
17.	laboratory tests for identification	No	
18.	laboratory tests for identification	No	
UNIT III SOIL HEAVING			
19.	Heave Prediction	yes	[T1] -1 & R[2]
20.	Method of prediction of heave	yes	
21.	Empirical methods	yes	
22.	Empirical methods	yes	
23.	Empirical methods	yes	
24.	Empirical methods	yes	
25.	double of dometer tests	yes	
26.	soil moisture suction	yes	
27.	field observations, shrinkage	yes	
UNIT IV DESIGN OF FOOTING			
28.	Foundation Design	No	[T1] -1 & R[3]
29.	Foundation Design	No	
30.	Foundation Design	No	
31.	Design consideration	No	
32.	individual and continuous footings	No	
33.	continuous footings	No	
34.	stiffened matsunderreamed piles	No	
35.	stiffened matsunderreamed piles	No	
36.	stiffened matsunderreamed piles	No	
UNIT V STABILIZATION			
37.	Stabilization methods	No	[T1] -1 & R[2]
38.	Stabilization methods	No	
39.	Stabilization methods	No	
40.	Stabilization methods	No	
41.	Stabilization methods	No	
42.	Stabilization methods	No	
43.	Stabilization methods	No	
44.	Stabilization methods	No	
45.	Stabilization methods	No	

Draft Lecture Schedule

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 Dr. R. Venkata Krishnaiah, Assistant 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.

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Course Teacher	Signature
Dr. R. Venkata Krishnaiah	
Mr.P.Dayaker	

Course Coordinator **HOD/CIVIL**