Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Civil Engineering

BCE503 - FOUNDATION ENGINEERING
Fifth Semester, 2017-18 (Odd Semester)

Course (catalog) description

To impart knowledge on common method of sub soil investigation and design of foundation and to acquire the capacity to investigate the soil condition and to select and design a suitable foundation.

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Compulsory/Elective course : Compulsory for Civil students

Credit / Contact hours : 3 credits / 45 hours

Course Coordinator : Dr. R. Venkata Krishnaiah , Professor

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Mr.P.Dayakar	Third year Civil-A,C,D	Civil Block			9.00 - 9.50 AM
Dr.S.J.Mohan	Third year Civil-B	Civil Block			12.45 - 1.15 PM

Relationship to other courses:

Pre –requisites : BCE 403 Soil Mechanics

Assumed knowledge : Basic knowledge in Foundation

Following courses : NIL

Syllabus Contents

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION 9

Introduction – Scope and objectives – Method of exploration: boring – Sampling – disturbed and undisturbed sampling – sampling techniques – Bore log and report – Penetration tests– Data interpretation – Selection of foundation based on soil condition

UNIT II SHALLOW FOUNDATION 9

Introduction – Location and depth of foundation – codal provisions – bearing capacity of shallow foundation on homogeneous deposits – bearing capacity from in-situ tests – Factors influencing bearing capacity – codal provisions – Settlement – Components of settlement – Settlement of foundations on granular and clay deposits – Allowable and maximum differential settlements of buildings – Codal provision – Methods of minimizing settlement.

UNIT III DESIGN OF FOOTING 9

Types of foundation – structural design of spread footing – Design aspects of combined and mat foundation – Codal provision

UNIT IV PILE FOUNDATION 9

Types of piles – Factors influencing the selection of pile – Carrying capacity in granular and cohesive soils – Static and dynamic formulae – Capacity from in-situ tests– Piles subjected to uplift – Negative skin friction – Group capacity – Settlement of pile groups – Interpretation of pile load test – Pile caps – Codal provisions

UNIT V RETAINING WALLS **9**

Earth pressure theory – Plastic equilibrium in soils – active and passive states – Rankine's theory – Coloumb's wedge theory – Classical and limit equilibrium solution – Earth pressure on retaining walls of simple configurations – pressure on the wall due to single line load alone – Graphical method (Culmann's method alone) – Stability of retaining wall.

TEXT BOOKS:

1. Punmia, B.C., Soil mechanics and foundations, Laxmi publications pvt. Ltd., New Delhi.

REFERENCES:

1. Khan, I.H., A text book of Geotechnical Engineering, Prentice Hall of India, New Delhi, 1999.
2. Arora K.R. Soil mechanics and foundation engineering, standard publishers and distributors, New Delhi, 1997.
3. Bowles J.E. Foundation analysis and design, McGraw Hill, 1994. 4. Gopal Ranjan and Ra

Computer usage: NIL

Professional component

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

Broad area: Site Investigation | Foundation design

Test Schedule

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

Mapping of Instructional Objectives with Program Outcome

This Course is to acquire the capacity to investigate the soil condition and to select and design a suitable foundation.	Correlates to program outcome		
	H	**M**	**L**
1. Select type of foundation required for the given soil condition.	c,d		
2. Determine the settlement of the foundation on different types of soil	C,d		
3. Find the dimensions of the foundation for isolated footing, combined footing and floating foundation	C,d		a
4. Analyze the group of piles for their load capacity	C,d	a	
5. Carry out stability analysis of retaining walls	A,c,d		

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

Session	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT SITE INVESTIGATION AND SELECTION OF FOUNDATION			
1.	Introduction	NO	[T1, R2]
2.	Scope and objectives	NO	
3.	Method of exploration: boring	NO	
4.	Sampling – disturbed and undisturbed sampling	NO	
5.	sampling techniques	NO	
6.	Bore log and report	NO	
7.	Penetration tests	NO	
8.	Data interpretation	NO	
9.	Selection of foundation based on soil condition	NO	
UNIT SHALLOW FOUNDATION			
10.	**Unit-II** Introduction	No	

11.	Location and depth of foundation – codal provisions	No	[T1, R2 & R3]
12.	bearing capacity of shallow foundation on homogeneous deposits	Yes	
13.	bearing capacity from in-situ tests	YES	
14.	Factors influencing bearing capacity – codal provisions	NO	
15.	Settlement – Components of settlement	NO	
16.	Settlement of foundations on granular and clay deposits	NO	
17.	Allowable and maximum differential settlements of buildings – Codal provision	Yes	
18.	Methods of minimizing settlement.	NO	

UNIT III DESIGN OF FOOTING			
19.	Types of foundation – s	NO	[T1,R2,R3]
20.	structural design of spread footing	NO	
21.	structural design of spread footing	YES	
22.	structural design of spread footing	YES	
23.	Design aspects of combined and mat foundation –	YES	
24.	Design aspects of combined and mat foundation –	YES	
25.	Design aspects of combined and mat foundation –	YES	
26.	Codal provisions.	YES	
27.	Codal provisions.	YES	
UNIT IV PILE FOUNDATION			
28.	Types of piles –	NO	[T1, R1,R2,R3]
29.	Factors influencing the selection of pile	NO	
30.	Carrying capacity in granular and cohesive soils –	YES	
31.	Static and dynamic formulae	NO	
32.	Capacity from in-situ tests–	NO	
33.	Piles subjected to uplift – Negative skin friction	NO	
34.	Group capacity – Settlement of pile groups	YES	
35.	Interpretation of pile load test –	YES	
36.	– Pile caps – Codal provisions	NO	
UNIT V RETAINING WALLS			[T1, R1,R2,R3]
37.	Earth pressure theory	YES	
38.	Plastic equilibrium in soils	YES	
39.	active and passive states	YES	
40.	Rankine's theory – Coloumb's wedge theory –	YES	
41.	Classical and limit equilibrium solution	Yes	
42.	Earth pressure on retaining walls of simple configurations	YES	
43.	pressure on the wall due to single line load alone –	NO	
44.	Graphical method (Culmann's method alone) –	YES	
45.	Stability of retaining wall.	NO	

Teaching Strategies

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

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

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

Prepared by: Dr.K.Venkata Krishnaiah, 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	
Dr.S.J.Mohan	

Course Coordinator **HOD/CIVIL**