
	SRI VIDYA COLLEGE OF ENGINEERING & TECHNOLOGY COURSE PLAN (THEORY)	
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ACADEMIC YEAR: 2018-2019(Odd)

Subject Code	CE6502		L	P	T	C
Subject Title	FOUNDATION ENGINEERING		3	0	0	3
Year / Dept / Sem	III / CIVIL / V	Regulation Year	2013			
Faculty Name / Desg / Dept	Mr.K.KALIRAJAN M.E., / Assistant Professor / CIVIL					
Course Prerequisite	1. The students must have details about site investigation techniques. 2. They have more details about properties of piles and types of foundations.					

SYLLABUS

CE6502

FOUNDATION ENGINEERING

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UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION

9

Scope and objectives – Methods of exploration – auguring and boring – Wash boring and rotary drilling – Depth of boring – Spacing of bore hole – Sampling techniques – Representative and undisturbed sampling – methods - Split spoon sampler, Thin wall sampler, Stationery piston sampler – Penetration tests (SPT and SCPT) - Bore log report – Data interpretation - strength parameters and Liquefaction potential - 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 – Terzaghi's formula and BIS formula – factors affecting bearing capacity – problems – Bearing capacity from in-situ tests (SPT, SCPT and plate load) Allowable bearing pressure – Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits – Total and differential settlement – Allowable settlements – Codal provision – Methods of minimizing total and differential settlements.

UNIT III FOOTINGS AND RAFTS

9

Types of footings – Contact pressure distribution: Isolated footing – Combined footings – Types and proportioning – Mat foundation – Types and applications – Proportioning – Floating foundation – Seismic force consideration – Codal Provision.

UNIT IV PILE FOUNDATION

9

Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil – static formula – dynamic formulae (Engineering news and Hileys) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – uplift capacity- Group capacity by different methods (Feld's rule, Converse – Labarra formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test (routine test only) – Under reamed piles – Capacity under compression and uplift.

UNIT V RETAINING WALLS

9

Plastic equilibrium in soils – active and passive states – Rankine's theory – cohesionless and cohesive soil – Coulomb's wedge theory – Condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Culmann Graphical method – pressure on the wall due to line load – Stability analysis of retaining walls.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers and Distributors 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. Purushothama Raj. P., "Soil Mechanics and Foundation Engineering", 2nd Edition, Pearson Education, 2013
4. Varghese, P.C., "Foundation Engineering", Prentice Hall of India Private Limited, New Delhi, 2005

REFERENCES:

1. Das, B.M. "Principles of Foundation Engineering" 5th edition, Thompson Asia Pvt.Ltd., Singapore, 2003.
2. Kaniraj, S.R. "Design aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill Publishing company Ltd., New Delhi, 2002.
3. Punmia, B.C. "Soil Mechanics and Foundations", Laxmi Publications Pvt.Ltd., New Delhi, 2005
4. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2007 (Reprint)
5. Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2005.
6. IS 6403 : 1981 (Reaffirmed 1997) "Breaking capacity of shallow foundation", Bureau of Indian Standards, New Delhi, 1998
7. IS8009 (Part1):1976 (Reaffirmed 1998) "Shallow foundations subjected to symmetrical static vertical loads", Bureau of Indian Standards, New Delhi, 1999
8. IS8009 (Part2):1980 (Reaffirmed 1995) "Deep foundations subjected to symmetrical static vertical loading", Bureau of Indian Standards, New Delhi, 1992
9. IS2911(Part1):1979 (Reaffirmed 1997) "Concrete Piles" Bureau of Indian Standards, New Delhi, 1994
10. IS2911(Part2):1979 (Reaffirmed 1997) "Timber Piles", Bureau of Indian Standards, New Delhi, 2007
11. IS2911(Part 3) :1979 (Reaffirmed 1997) "Under Reamed Piles", Bureau of Indian Standards, New Delhi, 1998
12. IS2911 (Part 4) :1979 (Reaffirmed 1997) "Load Test on Piles", Bureau of Indian Standards, New Delhi, 1997

<p>Course Objectives (CO)</p>	<p>CO1: To impart knowledge on common method of sub soil investigation</p> <p>CO2: To introduce students about design of foundation.</p> <p>CO3: Students will be introduced to properties of various piles commonly used in civil engineering construction.</p> <p>CO4: student acquires the capacity to investigate the soil condition and to select and design a suitable foundation</p> <p>CO5: To introduce students to know the fundamental behaviours of retaining walls and its types</p>
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Expected Course Outcomes (ECO)	At the end of the course, the students should be able to:											
	ECO1. Students will have the ability to select type of foundation required for the soil at a place and able to design shallow foundation and deep foundation.											
	ECO2. Compare the properties of piles used in building construction.											
	ECO3. Understand the typical and potential applications of boring methods used in site investigation.											
	ECO4. Understand the relationship between material properties and behaviours of retainingwalls.											
ECO5. Understand the importance of experimental verification of material properties.												
Mapping of CO & PO(Specify the PO's) - <i>(Fill the col.s with the legend given below)</i>												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	2	-	1	-	-	-	2	-	1	-	-	-
C02	-	1	-	-	-	-	1	-	2	2	-	2
C03	1	-	1	2	-	-	-	-	-	-	-	2
C04	1	2	-	2	-	-	-	-	-	-	-	-
C05	2	-	1	-	-	-	-	-	2	1	1	2
Bridging the Curriculum Gap (Additional Topics beyond syllabus/Seminars/Assignments)				BCG1: boring methods and sampling types BCG2: seismic behaviour of retaining wall BCG3: caisson piles								
Related Website URLs				W1: http://www.iitk.ac.in/nicee/wcee/article/8-vol3-533.pdf W2: http://www.iitk.ac.in/nicee/wcee/article/1496.pdf W3: http://www.nbmcw.com/articles/miscellaneous/others/25055-piled-raft-foundation-for-seismic-performance-of-tall-buildings.html								
Related Video Course Materials (min. 3 no.s)				V1: https://www.youtube.com/watch?v=row131Fr6JE V2: https://www.youtube.com/watch?v=H6-J8LuTa-M V3: https://www.youtube.com/watch?v=DzjukuaTNv4								

S.No	Topic Name	Book – P. No	Teaching Aids	No of hrs	Cumulative hrs
UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION					
1.	Scope and objectives – Methods of exploration	T1 581-583	Class room teaching	1	1
2.	Auguring and boring Wash boring and rotary drilling	T1 583-585	Class room teaching	2	3
3.	Depth of boring – Spacing of bore hole	T1 586-590	Assignments	1	4

4.	Sampling techniques – Representative and undisturbed sampling	T1 590-596	Class room teaching	1	5
5.	Sampling methods	T1 596-597	Class room teaching	2	7
6.	Split spoon sampler, Thin wall sampler, Stationery piston sampler	T1 598-600	Class room teaching	2	9
7.	Penetration tests (SPT and SCPT) - Bore log report – Data interpretation	T1 601-605	Seminars	1	10
8.	strength parameters and Liquefaction potential	T1 606-609	Class room teaching	1	11
9.	Selection of foundation based on soil condition.	T1 610-613	Assignments	1	12
UNIT II SHALLOW FOUNDATION					
1.	Introduction – Location and depth of foundation – Codal provisions	T1 619-620	Class room teaching	1	13
2.	Bearing capacity of shallow foundation on homogeneous deposits- Terzaghi's formula and BIS formula	T1 621-630	Class room teaching	1	14
3.	factors affecting bearing capacity-problems	T1 630-635	Assignments	2	16
4.	Bearing capacity from in-situ tests (SPT, SCPT and plate load) Allowable bearing pressure	T1 635-640	Class room teaching	2	18
5.	Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits	T1 640-659	Class room teaching	2	20
6.	Total and differential settlement – Allowable settlements – Codal provision	T1 659-663	Class room teaching	2	22
7.	Methods of minimizing total and differential settlements.	T1 665-694	Class room teaching	2	24
UNIT III FOOTINGS AND RAFTS					
1.	Types of footings	T1 694-695	Class room teaching	1	25
2.	Contact pressure distribution	T1 695-697	Class room teaching	2	27
3.	Contact pressure distribution: Isolated footing – Combined footings	T1 697-700	Assignments	1	28
4.	Mat foundation introduction	T1 701-702	Class room teaching	2	30
5.	Mat foundation Types and applications	T1 702-705	Class room teaching	2	32
6.	Types and proportioning	T1 705-707	Class room teaching	1	33
7.	Proportioning – Floating foundation	T1 708-710	Class room teaching	2	35
8.	Seismic force consideration – Codal Provision	T1 710-717	Seminars	1	36
UNIT IV PILE FOUNDATION					
1.	Types of piles and their function	T1	Class room	2	38

		723-725	teaching		
2.	Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil	T1 440	Class room teaching	2	40
3.	static formula – dynamic formulae (Engineering news and Hileys)	T1 442	Class room teaching	2	42
4.	Capacity from insitu tests (SPT and SCPT) – Negative skin friction – uplift capacity	T1 456-458	Class room teaching	2	44
5.	Group capacity by different methods (Feld's rule, Converse – Labarra formula and block failure criterion)	T1 468-471	Class room teaching	2	46
6.	Settlement of pile groups – Interpretation of pile load test (routine test only) – Under reamed piles Capacity under compression and uplift.	T1 472	Class room teaching	2	48

UNIT V RETAINING WALLS

1.	Plastic equilibrium in soils – active and passive states	T1 480-482	Class room teaching	1	49
2.	Rankine's theory – cohesionless and cohesive soil	T1 483-485	Class room teaching	2	51
3.	Coulomb's wedge theory – Condition for critical failure plane	T1 490-492	Class room teaching	2	53
4.	Earth pressure on retaining walls of simple configurations	T1 499-501	Class room teaching	2	55
5.	Culmann Graphical method	T1 505	Class room teaching	2	57
6.	pressure on the wall due to line load	T1 507-509	Seminars	2	59
7.	Stability analysis of retaining walls	T1 515	Seminars	1	60

	<i>Prepared by</i>	<i>Approved by</i>
Signature		
Name	Mr.K.KALIRAJAN	Prof.P.SURESH KUMAR
Designation	Assistant Professor / CIVIL	HOD /CIVIL
Signed date		

LEGEND:

METHODOLOGY TO MAP OBJECTIVE WITH OUTCOME

Course outcomes are achieved through

- a.** Suitable Analogies.
- b.** Class room teaching.

- c.** Assignments.
- d.** Tutorials
- e.** Weekly, monthly and model exams.
- f.** Brain storming.
- g.** Group discussion and role play.
- h.** Seminars