

CE2305-FOUNDATION ENGINEERING

SUBJECT DESCRIPTION AND OBJECTIVES

General principles concerning selection of foundation type on different types of soil; Bearing capacity theories, shallow and deep footings, difficult ground conditions including collapsing and swelling soils; performance observations in geotechnical engineering; preventative and remedial measures against ground movement and slope failure; buoyancy rafts and basements; selected problems of foundation analysis and design; dam foundations; stress Distribution and stress analysis; soil sampling and exploration; soil stabilisation including drainage.

OBJECTIVE

At the end of this course student acquires the capacity to assess the soil condition at a given location in order to suggest suitable foundation and also gains the knowledge to design various foundations.

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION 9

Scope and objectives – Methods of exploration-auguring and boring – Water boring and rotatory drilling – Depth of boring – Spacing of bore hole – Sampling – Representative and undisturbed sampling – sampling techniques – Split spoon sampler, Thin tube sampler, Stationary piston sampler – Bore log report – Penetration tests (SPT and SCPT) – 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 insitu tests (SPT,SCPT and plate load) – Allowable bearing pressure, Settlement – Components of settlement – Determination of settlement of foundations on granular and clay deposits – Allowable settlements – Codal provision – Methods of minimising settlement, differential settlement.

UNIT III FOOTINGS AND RAFTS 9

Types of foundation – Contact pressure distribution below footings and raft – Isolated and combined footings – Types and proportioning - Mat foundation– Types, applications uses and proportioning-- floating foundation.

UNIT IV PILES 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 Hiley's) – 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 – Forces on pile caps – 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 - Coloumb’s wedge theory – condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Graphical methods (Rebhann and Culmann) - pressure on the wall due to line load – Stability of retaining walls.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Murthy, V.N.S, “Soil Mechanics and Foundation Engineering”, UBS Publishers Distribution Ltd, New Delhi, 1999.
2. Gopal Ranjan and Rao, A.S.R. ”Basic and Applied Soil Mechanics”, Wiley Eastern Ltd., New Delhi (India), 2003.

REFERENCES

1. Das, B.M. “Principles of Foundation Engineering (Fifth edition), Thomson Books / COLE, 2003
2. Bowles J.E, “Foundation analysis and design”, McGraw-Hill, 1994
3. Punmia, B.C., “Soil Mechanics and Foundations”, Laxmi publications pvt. Ltd., New Delhi, 1995.
4. Venkatramaiah,C.”Geotechnical Engineering”, New Age International Publishers, New Delhi, 1995

MICRO LESSON PLAN

| Week | Hrs | Lecturer Topic | Book |
|-------------|--|---|-------------|
| I | UNIT I - SITE INVESTIGATION AND SELECTION OF FOUNDATION | | |
| | 1 | Scope and objectives | R4 |
| | 2 | Methods of exploration-auguring and boring | R4 |
| | 3 | Water boring and rotatory drilling | R4 |
| | 4 | Depth of boring – Spacing of bore hole | R4 |
| | 5 | Sampling – Representative and undisturbed sampling(AV Class) | R4 |
| II | 6 | sampling techniques – Split spoon sampler, Thin tube sampler, Stationary piston sampler | R4 |
| | 7 | Bore log report – Penetration tests (SPT and SCPT) | R4 |
| | 8 | Data interpretation (Strength parameters and Liquefaction potential) | R4 |
| | 9 | Selection of foundation based on soil condition. | R4 |
| III | UNIT II - SHALLOW FOUNDATION | | |
| | 10 | Introduction | R3 |
| | 11 | Location and depth of foundation – codal provisions | R3 |
| | 12 | bearing capacity of shallow foundation on homogeneous deposits | R3 |
| | 13 | Terzaghi's formula and BIS formula –factors affecting bearing capacity – problems | R3 |
| | 14 | Bearing Capacity from insitu tests (SPT,SCPT and plate load) | R3 |
| IV | 15 | Allowable bearing pressure, Settlement – Components of settlement | R3 |
| | 16 | Determination of settlement of foundations on granular and clay deposits | R3 |
| | 17 | Allowable settlements – Codal provision | R3 |
| | 18 | Methods of minimising settlement, differential settlement. (AV class) | R3 |
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| UNIT III - FOOTINGS AND RAFTS | | | |
|--------------------------------------|----|---|----|
| V | 19 | Types of foundation(AV class) | R3 |
| | 20 | Contact pressure distribution below footings and raft | R3 |
| | 21 | Isolated and combined footings | R3 |
| | 22 | Problems | R3 |
| | 23 | Types and proportioning | R3 |
| VI | 24 | Mat foundation | R3 |
| | 25 | Problems | R3 |
| | 26 | Types, applications uses and proportioning | R3 |
| | 27 | floating foundation | R3 |
| UNIT IV – PILES | | | |
| VII | 28 | Types of piles and their function(AV class) | R3 |
| | 29 | Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil | R3 |
| | 30 | Static formula - dynamic formulae (Engineering news and Hiley's) | R3 |
| | 31 | Capacity from insitu tests (SPT and SCPT) – Negative skin friction | R3 |
| | 32 | uplift capacity – Group capacity by different methods (Feld's rule, Converse Labarra formula and block failure criterion) | R3 |
| VIII | 33 | Settlement of pile groups | R3 |
| | 34 | Interpretation of pile load test | R3 |
| | 35 | Forces on pile caps – under reamed piles | R3 |
| | 36 | Capacity under compression and uplift | R3 |

| UNIT V - RETAINING WALLS | | | |
|---------------------------------|----|--|----|
| IX | 37 | Plastic equilibrium in soils | R3 |
| | 38 | active and passive states – Rankine’s theory | R3 |
| | 39 | cohesionless and cohesive soil | R3 |
| | 40 | Coloumb’s wedge theory | R3 |
| | 41 | condition for critical failure plane | R3 |
| X | 42 | Earth pressure on retaining walls of simple configurations | R3 |
| | 43 | Graphical methods (Rebhann and Culmann) | R3 |
| | 44 | pressure on the wall due to line load | R3 |
| | 45 | Stability of retaining walls(AV class) | R3 |

Prepared by

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