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| Department of Civil Engineering | | LP: CE18501 Rev. No: 02 Date: 27-07-2022 |
| B.E | : Civil Engineering | Regulation: 2018 |
| PG Specialisation | : NA | |
| Sub. Code / Sub. Name | : CE18501 / Applied Geotechnical Engineering | |
| Unit | : I / Site Investigation and Selection of Foundation | |

Unit Syllabus: Objectives – Various steps of investigation – Types of boring–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 – Geophysical methods-seismic and electrical - Selection of foundation based on soil condition – Strength Parameters and Evaluation of Liquefaction potential.

Objective: To make the students to plan and execute a detailed site investigation to select geotechnical design parameters and type of foundation.

| Session No * | Topics to be covered | Ref | Teaching Aids |
|--|---|--------------------------|---------------|
| 1 | Objectives, Various steps of investigation | R2 – Ch17 – Pg 415 - 416 | PPT |
| 2 | Types of boring, auguring and wash boring | R2 – Ch17 – Pg 415 - 416 | PPT |
| 3 | Rotary drilling, depth of boring and spacing of bore hole | R2 – Ch17 – Pg 417 - 421 | PPT |
| 4 | Sampling techniques, representative and undisturbed sampling | R2 – Ch17 – Pg 423 | PPT |
| 5 | Sampling methods – Split spoon sampler, Thin wall sampler, piston sampler | R2 – Ch17 – Pg 423 - 426 | PPT |
| 6 | Standard Penetration Test and Static Cone Penetration Test | R2 – Ch17 – Pg 427 - 431 | PPT |
| 7 | Bore log report and data interpretation | R2 – Ch17 – Pg 437 - 437 | PPT |
| 8 | Geophysical methods, seismic and electrical methods | R2 – Ch17 – Pg 433 - 435 | PPT |
| 9 | Selection of foundation based on soil condition, Evaluation of Liquefaction potential | R2 – Ch17 – Pg 438 | PPT |
| Content beyond syllabus covered (if any): Nil | | | |



Sub. Code / Sub. Name: CE18501 / Applied Geotechnical Engineering

Unit : II / Shallow Foundation

Unit Syllabus : 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 – 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.

Objective: To make the students to design shallow foundations, its component or process as per the needs and specifications

| Session No * | Topics to be covered | Ref | Teaching Aids |
|--------------|--|--------------------------|---------------|
| 10 | Introduction, Location and depth of foundation and Codal provisions | R2 – Ch24 – Pg 636 - 638 | PPT |
| 11 | Bearing capacity of shallow foundation Terzaghi's formula and BIS formula | R2 – Ch23 – Pg 593 - 602 | BB |
| 12 | Problems using Terzaghi's formula and BIS formula | R2 – Ch23 – Pg 625 - 628 | BB |
| 13 | Factors affecting bearing capacity and Bearing capacity from in-situ tests (SPT, SCPT) | R2 – Ch23 – Pg 610 - 611 | PPT |
| 14 | Plate Load Test and problems | R2 – Ch23 – Pg 621 - 623 | BB |
| | CAT 1 | | |
| 15 | Allowable bearing pressure and Seismic considerations in bearing capacity evaluation | R2 – Ch23 – Pg 593 - 600 | PPT |
| 16 | Determination of Settlement of foundations on granular and clay deposits | R2 – Ch23 – Pg 617 - 618 | BB |
| 17 | Total and differential settlement, Allowable settlements and Codal provision | R2 – Ch23 – Pg 617 - 619 | BB |
| 18 | Methods of minimizing total and differential settlements | R2 – Ch23 – Pg 618 - 620 | PPT |

Content beyond syllabus covered (if any): Nil



Sub Code / Sub Name: CE18501 / Applied Geotechnical Engineering

Unit : III / Footings and Rafts

Unit Syllabus: Types of Isolated footing, Combined footing, Mat foundation – Contact pressure and settlement distribution – Proportioning of foundations for conventional rigid behaviour – Minimum depth for rigid behaviour – Applications – Floating foundation – Special foundations – Seismic force consideration – Codal provision

Objective: To make the students to design combined footings and raft foundations, its component or process as per the needs and specifications

| Session No * | Topics to be covered | Ref | Teaching Aids |
|--------------|---|--------------------------|---------------|
| 19 | Types of Isolated footing, Combined footing, Mat foundation | R2 – Ch24 – Pg 636 - 638 | PPT |
| 20 | Contact pressure and settlement distribution | R2 – Ch11 – Pg 247 - 649 | BB |
| 21 | Proportioning of foundations for conventional rigid behavior – Isolated Footing | R2 – Ch24 – Pg 643 - 647 | BB |
| 22 | Proportioning of Rectangular combined footing | R2 – Ch24 – Pg 645 - 648 | BB |
| 23 | Proportioning of Trapezoidal combined footing | R2 – Ch24 – Pg 645 - 648 | BB |
| 24 | Minimum depth for rigid behaviour and its applications | R2 – Ch24 – Pg 649 - 652 | PPT |
| 25 | Floating foundation | R2 – Ch24 – Pg 636 - 638 | PPT |
| 26 | Special foundations | R2 – Ch34 – Pg 878 - 893 | PPT |
| 27 | Seismic force consideration and Codal provision | R2 – Ch24 – Pg 659 - 662 | PPT |
| | CAT 2 | | |

Content beyond syllabus covered (if any): Nil

* Session duration: 50 mins



Sub Code / Sub Name: CE18501 / Applied Geotechnical Engineering

Unit : IV / Pile Foundation

Unit Syllabus: Types of piles and their functions – 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, 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 – Codal provision.

Objective: To make the students to design deep foundations, its component or process as per the needs and specifications

| Session No * | Topics to be covered | Ref | Teaching Aids |
|--|--|--|---------------|
| 28 | Types of piles and their functions | R2 – Ch25 – Pg 671 - 673 | PPT |
| 29 | Factors influencing the selection of pile | R2 – Ch25 – Pg 673 | PPT |
| 30 | Carrying capacity of single pile in granular and cohesive soil using Static formula | R2 – Ch25 – Pg 677 - 683 | BB |
| 31 | Dynamic formulae (Engineering news and Hiley's) method | R2 – Ch25 – Pg 685 - 688 | BB |
| 32 | Capacity from in situ tests (SPT, SCPT) | R2 – Ch25 – Pg 688 - 690 | BB |
| 33 | Negative skin friction, Uplift capacity | R2 – Ch25 – Pg 684 R2 – Ch25 – Pg 694 | PPT |
| 34 | Group capacity by different methods (Feld's rule, Labarra formula and block failure criterion) | R2 – Ch25 – Pg 690 - 692 | BB |
| 35 | Settlement of pile groups and Interpretation of pile load test (routine test only) | R2 – Ch25 – Pg 692 - 693 | BB |
| 36 | Under reamed piles, Capacity under compression and uplift and Codal provision | R2 – Ch34 – Pg 884 - 885 | PPT |
| Content beyond syllabus covered (if any): Lateral Pile – Methods to arrive load carrying capacity of lateral pile | | | |

* Session duration: 50 mins



Sub Code / Sub Name: CE18501 / Applied Geotechnical Engineering

Unit : V / Retaining Walls

Unit Syllabus: 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 – Codal provision.

Objective: To make the students to design retaining walls, its component or process as per the needs and specifications

| Session No * | Topics to be covered | Ref | Teaching Aids |
|--|---|--------------------------|---------------|
| 37 | Plastic equilibrium in soils, Active and passive states | R2 – Ch19 – Pg 440 - 442 | PPT |
| 38 | Rankine's theory Cohesionless and cohesive soil, Coulomb's wedge theory | R2 – Ch19 – Pg 481 - 492 | BB |
| 39 | Condition for critical failure plane | R2 – Ch19 – Pg 490 - 492 | BB |
| 40 | Earth pressure on retaining walls of simple configurations | R2 – Ch19 – Pg 508 - 510 | BB |
| 41 | Problem Solving | R2 – Ch19 – Pg 515 - 517 | BB |
| 42 | Culmann Graphical method | R2 – Ch19 – Pg 501 - 504 | BB |
| 43 | Pressure on the wall due to line load | R2 – Ch19 – Pg 504 - 505 | BB |
| 44 | Problems on Culmann Graphical method | R2 – Ch19 – Pg 516 - 517 | BB |
| 45 | Stability analysis of retaining walls and Codal provision | R2 – Ch20 – Pg 518 - 549 | BB |
| | CAT 3 | | |
| Content beyond syllabus covered (if any): Nil | | | |


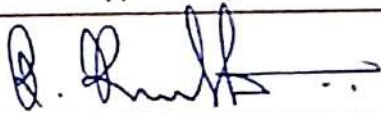
* Session duration: 50 mins



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3. Murthy V.N.S., Principles of Soil Mechanics and Foundation Engineering- (2009), 4th Edition, UBS Publishers and Distributors, New Delhi.
4. Braja. M. Das, Geotechnical Engineering; (2002), 5th Edition, Thomson Business Information India (P) Ltd., India
5. Donald P Coduto, Geotechnical Engineering- Phi Learning Private Limited, New Delhi, 2017
6. Shashi K. Gulathi & Manoj Datta, Geotechnical Engineering-. (2017), "Tata McGraw Hill
7. Muni Budhu ,Soil Mechanics and Foundation Engg.- (2011), 3rd Edition, John Wiley & Sons

| | Prepared by | Approved by |
|-------------|---|---|
| Signature |  |  |
| Name | Mr.S.Hariswaran | Dr.R.Kumutha |
| Designation | Assistant Professor | Professor and HOD |
| Date | 27-07-2022 | 27-07-2022 |
| Remarks *: | | |
| Remarks *: | | |

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD