

ADVANCED DESIGN OF FOUNDATIONS

II Semester: ST																													
Course Code	Category	Hours / Week			Credits	Maximum Marks																							
BSTC20	Elective	L	T	P	C	CIA	SEE	Total																					
		3	0	0	3	30	70	100																					
Contact Classes: 45		Total Tutorials: Nil		Total Practical Classes: Nil		Total Classes: 45																							
<p>I. COURSE OVERVIEW: Foundation engineering is a branch of geotechnical engineering which applies soil mechanics, structural engineering and project serviceability requirements for design and construction of foundations for on shore, offshore, and in-land structures. This course addresses the design of shallow, deep and well foundations, the stability of slopes, stability of retaining walls and embankments against failure. The course also discusses the safety and serviceability considerations in the design of foundations.</p> <p>II. COURSE OBJECTIVES: The student will try to learn:</p> <ol style="list-style-type: none"> I. The methods of soil exploration, field tests on soil by planning and soil investigation report documentation. II. The stability of infinite and finite slopes using different parameters. III. The various earth pressure theories and stability of retaining walls. IV. The lab experiments and field tests for the estimation of bearing capacity of shallow, deep and well, foundations. <p>III. COURSE OUTCOMES:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: left; padding: 5px;">After successful completion of the course, students should be able to:</th> </tr> </thead> <tbody> <tr> <td style="width: 10%; text-align: center; vertical-align: middle;">CO 1</td> <td style="width: 70%;">Discover standardized method of soil exploration for classifying the soil core type and to make decision on type and depth of foundation.</td> <td style="width: 20%; text-align: center; vertical-align: middle;">Analyze</td> </tr> <tr> <td style="text-align: center; vertical-align: middle;">CO 2</td> <td>Evaluate the bearing capacity of the foundation soil for selecting the suitable type and depth foundation and to make surface from the settlement.</td> <td style="text-align: center; vertical-align: middle;">Evaluate</td> </tr> <tr> <td style="text-align: center; vertical-align: middle;">CO 3</td> <td>Inspect the pile group capacity and settlement of the foundation soil under the action of eternal load for selecting the accurate type of the pile foundation.</td> <td style="text-align: center; vertical-align: middle;">Analyze</td> </tr> <tr> <td style="text-align: center; vertical-align: middle;">CO 4</td> <td>Examine the theories and recommended provisions to avoid underground structures free from the collapse and tilting.</td> <td style="text-align: center; vertical-align: middle;">Analyze</td> </tr> <tr> <td style="text-align: center; vertical-align: middle;">CO 5</td> <td>Select most accurate type and method for laying the sheeting and bracing related to shallow and deep cuts to make sure the structures safe from the uplift pressure.</td> <td style="text-align: center; vertical-align: middle;">Evaluate</td> </tr> <tr> <td style="text-align: center; vertical-align: middle;">CO 6</td> <td>Discover the soil-structure interaction under the shock load and vibration loads to ensure structures free from the failures due to the action of sudden and earthquake loads.</td> <td style="text-align: center; vertical-align: middle;">Analyze</td> </tr> </tbody> </table> <p>IV. SYLLABUS: MODULE-I: PLANNING OF SOIL EXPLORATION (09) Planning of Soil Exploration for Different Projects, Methods of Subsurface Exploration, Methods of Borings along with Various Penetration Tests.</p>									After successful completion of the course, students should be able to:			CO 1	Discover standardized method of soil exploration for classifying the soil core type and to make decision on type and depth of foundation.	Analyze	CO 2	Evaluate the bearing capacity of the foundation soil for selecting the suitable type and depth foundation and to make surface from the settlement.	Evaluate	CO 3	Inspect the pile group capacity and settlement of the foundation soil under the action of eternal load for selecting the accurate type of the pile foundation.	Analyze	CO 4	Examine the theories and recommended provisions to avoid underground structures free from the collapse and tilting.	Analyze	CO 5	Select most accurate type and method for laying the sheeting and bracing related to shallow and deep cuts to make sure the structures safe from the uplift pressure.	Evaluate	CO 6	Discover the soil-structure interaction under the shock load and vibration loads to ensure structures free from the failures due to the action of sudden and earthquake loads.	Analyze
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MODULE-II: SHALLOW FOUNDATIONS (09)

Requirements for Satisfactory Performance of Foundations, Methods of Estimating Bearing Capacity, Settlements of Footings and Rafts, Proportioning of Foundations using Field Test Data, Pressure - Settlement Characteristics from Constitutive Laws.

MODULE-III: PILE FOUNDATIONS (09)

Methods of Estimating Load Transfer of Piles, Settlements of Pile Foundations, Pile Group Capacity and Settlement.

Laterally Loaded Piles, Pile Load Tests, Analytical Estimation of Load- Settlement Behavior of Piles, Proportioning of Pile Foundations, Lateral and Uplift Capacity of Piles.

MODULE-IV: WELL FOUNDATION (09)

IS and IRC Code Provisions, Elastic Theory and Ultimate Resistance Methods. Tunnels and Arching in Soils. Pressure Computations around Tunnels.

MODULE-V: OPEN CUTS, COFFER DAMS (09)

Sheeting and Bracing Systems in Shallow and Deep Open Cuts in Different Soil Types. Cofferdams, Various Types, Analysis and Design, Foundations under uplifting loads, Soil-structure Interaction

V. TEXT BOOKS:

1. Kurian, Nainan P., and Nainan P. Kurian. "Design of foundation systems: principles and practices". Alpha Science Int'l Ltd., 2005.
2. J. E. Bowles, "Foundation Analysis and Design", Tata McGraw Hill New York, 1988.

VI. REFERENCE BOOKS:

1. Analysis and Design of Substructures, Swami Saran, Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi, 2002

VII. WEB REFERENCES:

1. <http://nptel.ac.in/courses/105105039/>

VIII. E-TEXT BOOKS:

1. <https://lecturenotes.in/subject/244/advanced-foundation-engineering-afe>