20CE4501B - FOUNDATION ENGINEERING

Offering branch: CE			
Course Category:	Professional Elective	Credits:	3
Course Type:	Theory	Lecture-Tutorial-Practical:	3-0-0
Prerequisites:	20CE3402- Geotechnical Engineering	Continuous Evaluation:	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	**Show** the sampling procedure for subsequent testing in the lab	K2
CO2	**Determine** the depth of the foundation and construct the shallow foundations under eccentric stress under the complex ground surface conditions	K3
CO3	**Decide** which pile foundation is needed and construct the deep foundation for problematic soil	K5
CO4	**Design** the retaining walls based on the soil-structure interaction response, using force equilibrium analysis	K6
CO5	**Calculate** the governing forces for slope failure and safeguard the soil structure from catastrophic slope failure.	K4

Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2		2	2	2				2	2	2
CO2	2	2	2	2		2	2	2				2	2	2
CO3	3	3	3	3		3	3	3				3	3	3
CO4	2	2	2	2		3	3	3				3	2	3
CO5	2	2	2	2		3	3	3				3	2	3
Avg.	**2**	**2**	**2**	**2**		**3**	**3**	**3**				**3**	**2**	**3**

1- Low **2-Medium** **3-High**

Course Content

UNIT-1	**Subsoil Exploration** Methods of subsoil exploration, direct, indirect methods, Dynamic cone and static cone penetration tests. Boring & Sampling: Types of boring, types of samples, criteria for undisturbed samples, transport and preservation of samples, report writing.	**CO1**
UNIT-2	**Shallow Foundations**, **Bearing Capacity Criteria** Types of foundations and factors to be considered in their location, General requirements for the foundation, Analytical Methods of Determining the Bearing Capacity; Theory of elasticity, the classical earth pressure theory, Theory of plasticity, IS Methods **Settlement Criteria:** Safe bearing pressure based on N- value, allowable bearing pressure; safe bearing capacity and settlement from plate load test, Types of foundation settlements and their determination, allowable settlements of structures.	**CO2**
UNIT-3	**Pile Foundations** Classification, load carrying capacity of single pile, dynamic formula, static formula, pile load, cyclic pile load tests, load capacity of pile groups, negative skin friction on plies, under reamed pile foundations in expansive sub-soils.	**CO3**
UNIT-4	**Earth Pressure**: Types of earth pressures, Rankine's active and passive earth pressures, **Sheet pile structures:** Cantilever sheet pile, Anchored bulkheads, Braced sheeting	**CO4**

	in cuts, Cellular cofferdams	
UNIT-5	**Stability of Slopes** Infinite and finite earth slopes in sand and clay, types of failures, factors influencing slope stability. Stability Analysis: Swedish slip circle – ø = 0 analysis, c-ø analysis, Fellinius method of locating critical slip centre, friction circle methods, Taylor's stability number, Bishop's method of stability analysis.	**CO5**

Learning Resources

Text Books	1. Gopala Ranjan and A.S.R. Rao, Basic and Applied Soil Mechanics, New age Publishers, 2000. 2. C. Venkataramaiah, Geotechnical Engineering, New Age Publishers, 2006.
Reference Books	1. V.N.S. Murthy, Soil Mechanics, Foundation Engineering, UBS Publishers, 2011. 2. J.E. Bowles, Foundation Analysis and Design, McGraw Hill, Publishers, 2001. 3. M.D. Braja, Principles of Geotechnical Engineering, 7/e, Cengage Learning: 2013. 4. P.C. Donald, Geotechnical Engineering, Prentice-Hall India, 2010. 5. Rodrigo Salgado, The Engineering of Foundations, Mcgraw Hill, 2006. 6. Iqbal H, Khan, Textbook of Geotechnical Engineering, Prentice Hall of India,2005.
e-Resources& other digital material	1. https://nptel.ac.in/courses/105105176/