

SCHEME OF COURSE WORK

Course Details:

Course Title:	ADVANCED FOUNDATION ENGINEERING		
Course Code:	15CE2211	L P C	: 4 0 3
Program:	M. Tech.		
Specialization:	Structural Engineering		
Semester:	II		
Prerequisites:	G.T.E-1,G.T.E-2		
Courses to which it is a prerequisite:	Soil Dynamics and Machine foundations		

Course Outcomes (COs):

At the end of the course, the student will be able to:

1	Identify a suitable foundation system for a structure.
2	Evaluate the importance of raft foundation and principles of design for buildings and tower structures.
3	Analyse and design pile foundations.
4	Examine and discuss various machine foundations.
5	Analyse and design sheet piles and cofferdams.

Program Outcomes (POs):

Post graduates will be able to:

1	Synthesize existing and new knowledge in various sub areas of structural engineering
2	Analyse complex engineering problems critically with adequate theoretical background for practical applications.
3	Evaluate a wide range of feasible and optimal solutions after considering safety and environmental factors.
4	Demonstrate the ability to pursue research by conducting experiments and extract the relevant information through literature surveys.
5	Use state –of- the- art of modern tools for interpreting the behavior and modeling of complex engineering structures.
6	Attain the capability to work in multi-disciplinary teams to achieve common goals.
7	Demonstrate the knowledge to perform the projects efficiently in multi-disciplinary environments after consideration of economic and financial matters.
8	Communicate effectively on complex engineering activities to prepare reports and make presentations.
9	Engage in life-long learning independently to improve knowledge.
10	Understand the responsibility of carrying out professional practices ethically for sustainable development of society.
11	Examine critically and independently one's actions and take corrective measures by learning from mistakes.

Course Outcome versus Program Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	S	S	S	M							M
CO-2	S	S	S	S	M						M
CO-3	S	S	M	M							M
CO-4	S	S	S	S	M						M
CO-5	S	S	S	M	S						M

S - Strongly correlated, M - Moderately correlated, Blank - No correlation

Assessment Methods:

Assignment / Seminar / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week No.	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Foundation design basics: Criteria for choice of foundation, bearing capacity.	CO-1	1. Explain the criteria for choice of foundation.	<ul style="list-style-type: none"> ▫ Lecture ▫ LCD projector 	
2	Total and differential settlement tolerance for various types of structures.	CO-1	1. Discuss the tolerance values of total and differential settlement for various structures.	<ul style="list-style-type: none"> ▫ Lecture ▫ Problem solving 	
3	Interpretation of soil profile from design parameters like modulus of compressibility, Modulus of sub grade reaction, Poisson's ratio, etc.	CO-1	<ol style="list-style-type: none"> 1. Explain the procedure for determining the modulus of subgrade reaction. 2. Explain the procedure for determining the Poisson's ratio 	<ul style="list-style-type: none"> ▫ Lecture ▫ Problem solving 	
4	Raft foundations: Raft foundations for building and tower structures, including effects of soil-structure interaction and nonlinearity.	CO-2	1. Explain the situations where raft foundation is preferred.	<ul style="list-style-type: none"> ▫ Lecture ▫ Problem solving 	Assignment
5	Different types of rafts	CO-2	1. Discuss various types of rafts.	<ul style="list-style-type: none"> ▫ Lecture ▫ Problem solving 	
6	Pile foundation-types, methods of installation, codal practices for permissible load under vertical and lateral loads, stresses during pile driving.	CO-3	<ol style="list-style-type: none"> 1. Classification of piles 2. Determine the lateral load carrying capacity of piles 3. Determine the vertical load carrying capacity of piles 	<ul style="list-style-type: none"> ▫ Lecture ▫ Problem solving 	
7	Load carrying capacity of pile groups, negative skin friction, under-reamed piles	CO-3	<ol style="list-style-type: none"> 1. Explain the Load carrying capacity of pile groups. 2. Explain negative skin friction of piles. 3. Write about under-reamed piles 	<ul style="list-style-type: none"> ▫ Lecture ▫ Problem solving 	Assignment
8	Foundation for heavy structures, well foundations, caisson foundations, equipment used for construction of these foundation	CO-3	<ol style="list-style-type: none"> 1. Write about Components of well foundations with neat sketches 2. Explain the equipment used for construction of well foundation 	<ul style="list-style-type: none"> ▫ Lecture ▫ Problem solving 	

9	MID TEST – I				
10	Theory of vibrations, free and forced vibrations with damping for a single degree freedom system	CO-4	1. Explain the free vibrations with damping for a single degree freedom system 2.Explain the forced vibrations with damping for a single degree freedom system	▫ Lecture ▫ Problem solving	Assignment
11	Free and Forced vibrations without damping for a single degree freedom system	CO-4	1. Explain the free vibrations without damping for a single degree freedom system. 2.Explain the forced vibrations without damping for a single degree freedom system	▫ Lecture ▫ Problem solving	
12	Types of machine foundations, their design criteria.	CO-4	1. Discuss various types of machine foundations with their design criteria.	▫ Lecture ▫ Problem solving	
13	Permissible amplitudes and bearing pressure for various types of machine foundations	CO-4	1. Discuss the Permissible amplitudes for various types of machine foundations 2. Discuss the permissible bearing pressure values for various types of machine foundations.	▫ Lecture	
14	Cantilever sheet piles and anchored bulkheads: Earth pressure diagram, determination of depth of embedment in sands and clays.	CO-5	1. Determine the Earth pressure expression and diagram for Cantilever sheet pile. 2. Determination of depth of embedment in sands and clays.	▫ Lecture ▫ Problem solving	
15	Timbering of trenches, Earth pressure diagrams, forces in struts.	CO-5	1. Explain Timbering of trenches. 2. Deduce the Earth pressure expression for anchored bulk head.	▫ Lecture ▫ Problem solving	Assignment
16	Cofferdams: Stability, bearing capacity, settlements (qualitative treatment only, no designs).	CO-5	1. Write about various types of coffer dams 2. Discuss the stability criteria for coffer dams 3. Discuss the settlement criteria for coffer dams. 4. Determine the bearing capacity of cofferdams	▫ Lecture ▫ Problem solving	Assignment
17	MID TEST – II				
	END EXAM				