

SOIL DYNAMICS AND MACHINE FOUNDATIONS

Offering branch: CE														
Course Category:	HONORS										Credits:	4		
Course Type:	Theory										Lecture-Tutorial-Practical:	3-1-0		
Prerequisites:	20CE3402- Geotechnical Engineering 20CE4601B – Foundation 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	Calculate the dynamic characteristics of the soil													K3
CO2	Design a foundation that can sustain various dynamic reactions													K6
CO3	Modify the foundation by developing an interactive design under the complicated dynamic response													K3
CO4	Design the best suitable machine foundation													K6
CO5	Assess the load transfer mechanism for various dynamic response scenarios													K5
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		3	3	3				3	2	3
CO3	3	3	3	3		2	2	2				2	3	2
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	Introduction: Types of motion, SHM, Fundamental definitions, SDOF systems, Free and forced vibration with and without damping, Constant force and rotating mass type excitation. Damping: Types of damping, Equivalent stiffness of springs in series and parallel, Resonance and its effect, magnification-logarithmic decrement, Transmissibility.													CO1
UNIT-2	Vibration Analysis: Theories of Vibration Analysis, EHS Theory and lumped parameter model, Different modes of vibration, Natural frequency of foundation soil system, Barkan and IS methods. Pressure bulb concept, Reisner Theory, Limitations of Reisner theory, Sung's solutions, Pauw's Analogy, Heigh's Theory.													CO2
UNIT-3	Dynamic properties: Determination of E, G and Poissons ratio from field and laboratory tests, recommendations of Indian codes, Stress waves in bounded elastic medium. Wave theory: Use of wave theory in the determination of elastic properties, Elastic coefficients of soils and their determination- damping factor from free and forced vibration tests, Block vibration test, and Determination of Damping factor.													CO3
UNIT-4	Machine foundations: Types of machine foundations, general requirements design, criteria for machine foundations, permissible amplitudes and bearing pressure Design data. Design: Design criteria, IS code provisions for the design foundations of reciprocating machines.													CO4
UNIT-5	Vibration Isolation: Transmissibility, Principles of isolation, Methods of isolation Vibration isolators, Types and their characterizes. Special Topics: Liquefaction of soils, CSR, CRR, Factor of safety against liquefaction, Dynamic bearing capacity, Earth retaining structures under dynamic loads.													CO5
Learning Resources														
Text Books	1. Soil Mechanics and Machine foundations, Swami Saran, Galgotia Publications. 2. Fundamentals of Soil Dynamics, B M Das, Centage Learning													

Reference Books	<ol style="list-style-type: none">1. Vibrations of Soils and Foundations, Richart Hall and Woods2. Vibration Analysis and Foundation Dynamics, NSV Kameswara Rao, Wheeler Publishing, New Delhi.3. Foundations of Machines- Analysis and Design, Prakash and Puri4. Analysis and design of Foundations for Vibrations, P J Moore5. Dynamics of bases and Foundations, D Dbarkar
e-Resources& other digital material	<ol style="list-style-type: none">1. https://nptel.ac.in/courses/ 105101005/