

Soil Dynamics - Web course

COURSE OUTLINE

Due to large scale infrastructural development, need of subjects like soil dynamics has increased manifold. In some institutions in India, this subject is already being taught for last 25 years or so at graduate level and also at post-graduate level.

The present course is aimed to bring out the advanced theories and practical knowledge of soil dynamics. Each topic will be attempted to develop in logical expression.

Design of machine foundations is an important topic which comes under this subject. These days, every heavy industry has big size machines, which require special attentions for design.

This course shall involve detailed design of foundations for machines like reciprocating engines, impact hammers etc. in a simple lucid language.

The other necessary topics like theory of vibrations, dynamic soil properties, dynamic earth pressures, Pile foundations under dynamic loads, liquefaction of soil, machine foundations and vibration isolations shall also be covered. All the chapters shall include illustrated examples also.

COURSE DETAIL

Sl.No	Topic	No. of Hours
1	Introduction: Scope and objective.	1
2	Soil Behaviour under Dynamic and Cyclic Loading: Elastic response of continua (one two and three dimensional wave equation), response of non-plastic and plastic	9



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Civil Engineering

Pre-requisites:

1. Soil Mechanics (Geotechnical Engineering I).
2. Foundation Engg (Geotechnical Engineering II).

Additional Reading:

1. Literature on Advanced foundations.
2. IS codes on foundations.

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	soils under cyclic loading; stress-strain models(elastic, visco-elastic, nonlinear elastic, plasticity); Liquefaction.	
3	Dynamic Soil Parameters: Stiffness, damping, and plasticity parameters of soils and their determination (laboratory testing, and intrusive and non intrusive insitu testing); Correlations; assessment of liquefaction potential.	9
4	Vibration theory: Undamped and damped free and forced vibrations, forced vibrations due to support motions, and rotating mass and constant force oscillators, non harmonic forced vibration, Duhamel's integral, introduction to Fourier transform, introduction to two and multi degree of freedom systems, response spectra.	5
5	Machine Foundations: Vertical, torsional, sliding and rocking modes of oscillation, coupled motion, practical design considerations, vibration control.	5
6	Pile Foundations: One dimensional wave equation for analyzing pile driving, response of single and pile groups under dynamic loading,pile response in liquefied sites.	6
7	Dynamic Soil Structure Interaction: Response of buried structures to seismic wave propagation and ground displacement.	5

References:

1. Swami Saran, "Soil Dynamics and Machine Foundations", Galgotia Publications (P) Ltd.
2. Braja M. Das, "Fundamentals of soil dynamics", Elsevier.
3. Satyendra Mittal & J.P.Shukla, "Soil Testing for Engineers", Khanna Publishers , New Delhi.
4. Satyendra Mittal, "Pile Foundations Design & Construction", CBS Publishers & Distributors, New Delhi.
5. K.G.Bhatia, "Foundations for Industrial Machines" D-CAD publishers, New Delhi.