Cost

The registration fee of the workshop will be £210 which includes course notes and lunches. You should make your own arrangements for accommodation.

Payment
ASRANet Ltd. accepts payments by cheque, cash and bank transfer. Please contact for further details.

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Seismic Design of Foundation Structures

(A Maritime Company for Courses, Conferences and Research)

ABOUT THE COURSE

Design of various structures, such as bridges, high rise buildings, nuclear power plant structures in various seismic zones govern by the earthquake forces. It is therefore essential for the engineers to understand the implications of seismic actions. This course aims to highlight the important aspects of foundation design in relation to seismic actions. The course will introduce the structural damage induced by earthquakes, especially their effects on foundations and provide the necessary link between the earthquake cause and the effects and how to consider this in earthquake resistant design. Geotechnical aspects such as the seismic slope analysis, evaluation of dynamic soil properties will be discussed. Based on best practice and code compliance, the focus will be on the parameters required for design and interpretation of analysis. General rules, seismic actions, different types of analysis, response spectra method will also be dealt with. The course will also address numerical modelling and soil-structure interaction aspects in foundation design for seismically active zones. The ground effects on the foundations especially the soil pile interaction will be discussed including the role of inertial interaction and kinematic interaction. Lectures during this course will also cover design of shallow and deep foundations. The use of reliability based design philosophy for earthquake analysis and design will also be addressed.

WHO SHOULD ATTEND

Engineers and scientists involved in the design, operation and assessment of both onshore and offshore structures and their associated equipment. Personnel from oil companies, consultancy organisations, classification societies and certifying authorities will benefit from attending this course.

PROGRAMME

Day 1

08.30 – 09.00 Delegate Registration

09.00 – 10.30 Lecture 1: Introduction to Earthquake Engineering

10.30 – 10.45 *Break*

10.45 – 12.15 Lecture 2: Fundamental of Structural dynamics & Seismic analysis of Structures

12.15 – 13.30 *Lunch*

13.30 – 15.00 Lecture 3: Seismic Hazard Assessment [PHSA and DHSA] and Seismic Design Philosophy for Design of Structures

15.00 – 15.30 *Break*

15.30 – 17.00 Lecture 4: Role of Soil-Structure Interaction in Design of Structure

Day 2

09.00 - 10.30 Lecture 5: Geotechnical aspects of Earthquake Engineering

10.30 - 10.45 *Break*

10.45 - 12.15 Lecture 6: Seismic design of shallow and deep foundation

12.15 -13.30 *Lunch*

13.30 - 15.00 Lecture 7: Role of numerical modelling

15.00 - 15.30 *Break*

15.30 - 17.00 Lecture 8: Reliability Aspects of Seismic Resistance Design

Lecture Content

Lecture 1: Introduction to Earthquake Engineering

Different types of earthquake hazards structures, ground failure induced damages, predominantly structure related damages. First fundamental concepts of earthquake engineering are introduced i.e. the way earthquakes are generated and how forces are experienced by the structure i.e. seismic wave propagation. Although this is the subject of an entire different discipline, the description is kept brief and is used to provide the necessary link between the earthquake cause and the effects and how to consider this in earthquake resistant design

Lecture 2: Fundamental of Structural dynamics & Seismic analysis of Structures

Fundamental structural dynamics will be discussed in a generic way, with earthquake loading forming a special case of loading. Modal analysis will be covered (Single degree of freedom systems to multi-degree of freedom structures).

Lecture 3: Seismic Hazard Assessment [PHSA and DHSA] and Seismic Design Philosophy for Design of Structures

Based on best practice and code complaint. The focus will be on the parameters required for design and interpretation of the specialised PHSA analysis. Introduces the hazard assessment i.e. quantification of the hazard. This will mainly constitute PSHA (Probabilistic Seismic Hazard Assessment) and DSHA (Deterministic Seismic Hazard Assessment). The outputs of the hazard assessment are the necessary input to the structural and Geotechnical Engineers, which will be highlighted in this lecture. Example problems will be taken.

Lecture 4: Role of Soil-Structure Interaction in Seismic Design of Structure

Explain the various Soil-Structure-Interaction and simplified methods that can be to carry out soil-structure analysis will be described. Role of inertial interaction, kinematic interaction will be discussed. Role of soil-structure interaction for shallow foundation and piled raft supported structure and various modelling aspects will also be addressed.

Lecture 5: Geotechnical aspects of Earthquake Engineering

Geotechnical earthquake engineering requires understanding ground motion parameters and dynamic properties of soil. Various field and laboratory testing method will be discussed to evaluate important dynamic soil properties which are involved in seismic design. Seismic slope stability analysis and seismic design of retaining structures will be discussed.

Lecture 6: Seismic Design of Shallow and Deep Foundation

This lecture will cover the methods of selecting input motion for seismic design for deep and shallow foundation. Special emphasis will be focussed on areas where ground motions may not be available. Additional criteria for selection of ground motion will be discussed. It will also cover the design of foundations in seismic areas. Incorporation of ground response analysis including liquefaction susceptibility i.e. how the ground alters the ground motion characteristics will be presented. Typical example problems will be taken.

Lecture 7: Role of Numerical Modelling

Dynamic analysis techniques that are commonly used to determine the response of structures due to random (seismic) loading. The concept of frequency domain and time domain techniques are studied, and how these analyses should be used for subsequent assessment and design. The use of finite element analysis to determine structure response to a seismic input will also be addressed.

Lecture 8: Reliability Aspects of Earthquake Resistance Design

An introduction to the reliability analysis of structures will be given. Various reliability analysis techniques like FORM, SORM will be introduced. The safety margin equation for various limit states will be explained in detail and some safety margin equations for the earthquake resistant design will be dealt with along with some example problems