ON-LINE
Finite element for Marine structures
3rd-4th October 2024

ABOUT THE COURSE

This course is the basic of the Finite Element Analysis. It takes you through various topics like Matrix Algebra, Differential Equations and their solutions and FEM-Weighted Residue Approach. Various numerical are solved to explain different concepts and their applications. These topics help while solving of next course chapters.

It start with Introduction to Finite Element Analysis, its advantages, disadvantages and applications. Then introduction to some basics of Matrix Algebra. Further, development of element stiffness coefficients based on fundamental principle is discussed. This extends from 1D element to 3D elements. Also, solution technique for finite element equations are discussed with examples. The course, further, extend to the dynamic analysis of structure using Finite element analysis. Several, practical example are discussed from modelling to exact solution of finite element technique. This is very important as ANSYS or Abaqus solutions need to be checked by exact solution for their accuracy.

WHO SHOULD ATTEND

Engineers and scientists involved in the design, operation and assessment of both onshore and offshore structures.

COST

The registration fee of the workshop will be £595 plus VAT (VAT UK ONLY) which includes course notes.

PAYMENT

Payments can be made by cheque (made payable to ASRANet Ltd.) or bank transfer. Please enquire for details.

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CONTACT
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PROGRAMME

PROGRAMME (All timings are in BST (GMT +1)

THURSDAY 3rd October 2024

08:00- 09:00 **LECTURE 1:**
Introduction

a. How does FEA works
b. A general procedure for FEA
c. Brief history
d. Examples of FEA

09:00-09.15 **BREAK**

09:15 – 11;45 **LECTURE 2:** Stiffness matrices for 1D

a. Using total potential energy technique
    i. Bar element
    ii. Beam element
    iii. Shaft element
    iv. Example formulation
b. Solution (2 lecture)
    i. Matrices transformation and assembling
    ii. Solution techniques

11:45-12:45 **LUNCH**

12:45- 14:15 **LECTURE 3:** Two dimensional FEA

a. Introduction:- dimensionality of a problem
b. 2D elements for structural mechanics
c. Approximation of Geometry and field variable, formulation of equation.
d. Matrices transformation and assembling
e. Solution of static equilibrium equations

14:15- 14:30 **BREAK**

14:30-15:30 **LECTURE 4:** Three dimensional FEA

a. Introduction
b. 3D elements for structure mechanics
c. Formulation of equation
d. Solution techniques

FRIDAY 4th October 2024

08:00- 09:30 **LECTURE 1:** Application in solid mechanics

a. Plane stain, plane strain problem
b. General three dimensional stress element
c. torsion

09:30-09:45 **BREAK**

09:45-11:15 **LECTURE 2:** Structural Dynamics

a. Development of FEA equation
    i. Mass matrix for general element
    ii. Damping matrix
    iii. Solution technique

11:15-12:15 LUNCH

12:15-13:45 **LECTURE 3:** Case study of a Jacket structure

13:45- 14:00 **BREAK**

14:00 15:30 **LECTURE 4:** Case study of a manned-semisubmersible

ABOUT THE LECTURER:

Dr Deepak Kumar

Dr Deepak Kumar holds a Ph.D. in structural dynamics from Indian Institute of Technology, Delhi, as well as Masters and Bachelor's degree in Structural engineering and Civil engineering, respectively. He is presently associate professor in department of ocean engineering at Indian Institute of Technology, Madras, India. Dr Deepak Kumar is responsible for undergraduate and graduate teaching in the area of Analysis of offshore structure (including finite element analysis), Structural dynamics, Random vibration, Reliability of structures. Dr Deepak Kumar has research interest in structural dynamics, response control of offshore structures, Stochastic structural control and fluid structure interaction.