

# AMC- 17: ADVANCED STRUCTURAL ANALYSIS

## 1. FUNDAMENTAL CONCEPTS:

Introduction, historical background, outline of presentation, stresses and equilibrium, boundary conditions, strain-displacement relations, stress-strain relations, temperature effects, potential energy and equilibrium, alerkin's method, von mises stress, computer programs, historical references.

## 2. ONE-DIMENSIONAL PROBLEMS

Introduction, finite element modeling, coordinates and shape functions, the potential-energy approach, the galerkin approach, assembly of the global stiffness matrix and load vector, the finite element equations; treatment of boundary, quadratic shape functions, temperature effects.

## 3. TWO-DIMENSIONAL PROBLEMS USING CONSTANT STRAIN TRIANGLES:

Introduction, finite element modeling, constant-strain triangle (cst), orthotropic materials, meshgen input file.

## 4. BEAMS AND FRAMES:

Introduction, finite element formulation, load vector, boundary considerations, shear force and bending moment, beams on elastic supports, plane frames, some comments, three-dimensional problems in stress analysis, finite element formulation, stress calculations, mesh preparation, hexahedral elements and higher order elements, problem modeling, frontal method for finite element matrices.

## 5. DYNAMIC CONSIDERATIONS:

Introduction, element mass matrices, evaluation of eigenvalues and eigenvectors, interfacing with previous finite element programs and a program for determining critical speeds of shafts, guyan reduction, rigid body modes.

