AMSV17 ADVANCED STRUCTURAL ANALYSIS

UNIT-1 FUNDAMENTAL CONCEPTS

1.1 Introduction, historical background, outline of presentation, stresses and equilibrium, boundary conditions, strain displacement relations, stress-strain relations,

1.2 Temperature effects, potential energy and equilibrium,

1.3 Alerkin's method, von mises stress, computer programs, historical references.

UNIT-2 ONE-DIMENSIONAL PROBLEMS

2.1 Introduction, finite element modeling, coordinates and shape functions, the potential-energy approach, the galerkin approach,

2.2 Assembly of the global stiffness matrix and load vector, the finite element equations; treatment of boundary, quadratic shape functions, temperature effects.

UNIT-3 TWO-DIMENSIONAL PROBLEMS USING CONSTANT STRAIN TRIANGLES

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

UNIT-4 BEAMS AND FRAMES

4.1 Introduction, finite element formulation, load vector, boundary considerations, shear force and bending moment, beams on elastic supports, plane frames,

4.2 Some comments, three-dimensional problems in stress analysis, finite element formulation, stress calculations, mesh preparation, hexahedral elements and higher order elements,

4.3 Problem modeling, frontal method for finite element matrices.

UNIT-5 DYNAMIC CONSIDERATIONS

5.1 Introduction, element mass matrices, evaluation of eigenvalues and eigenvectors, interfacing with previous finite element,

5.2 Programs and a program for determining critical speeds of shafts, guyan reduction, rigid body modes.

Reference books:

1. Matrix and Digital Computer Methods in Structural Analysis by W M Jenkins
2. Matrix Methods of Structural Analysis by P N Godbole and R S Sonparote