GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC SEMESTER : VII

CIVIL ENGINEERING

Subject Name: **ADVANCED STRUCTURAL ANALYSIS**

Sr. No	Course Content
1.	**Stiffness Method (Member Approach) :** Overview of different stiffness & rotation-transformation matrices, analysis of beam, truss, plane frame with external load and secondary effects, Analysis of Grid & Space structures under loading & various secondary effects like deformation of support, prestrain & temperature, Analysis of Composite structures having combination of different types members.
2.	**Stiffness Method (Special topics)** Symmetry/Anti-symmetry, Oblique, supports Elastic supports, Axial-flexural interaction. **Nonlinear Analysis :** Concepts of nonlinearity like Material nonlinearity, Geometry nonlinearity & Nonlinear analysis.
3.	**Finite Element Method**: Introduction to FEM, Types of problems, Stresses & Equilibrium, Strain-displacement relations, Stress-strain relations. Application of FEM to One dimensional (bar & beam) problems & two dimensional problems using Constant strain triangles. Two dimensional iso-parametric elements – Four nodded quadrilateral elements, numerical integration, higher order elements.
4.	**Computer Applications:** Algorithm of Stiffness method Member Approach/Finite Element method. Different techniques for solution of equations using matrices, banded matrix, storage techniques for large size problem. Development of computer programs for analysis of skeletal structures using C/ C++. Application of professional software for structural analysis and design of real life structures.

All Topics Carries equal weightage.

Term Work: Term work shall consists of

(1) Minimum 5 problems from each topics no.1, 2 & 3 & cross checking with any professional software and/or user made program.

(2) C/C++ Programs with inputs/outputs for one skeletal structure.

(3) Analysis of at least one real-life structure using Professional software.

Useful Software:

STAAD-Pro/STRUDS/SAP-2000/STRAP/ETABS/ANSYS/VC++

Text Books:

1. Gere & Weaver ; Matrix Analysis of Framed Structures, CBS Publication
2. Bhavikatti; Finite Element Analysis, New Age International Publishers

Reference Books:

1. Meghre & Deshmukh ; Matrix Analysis of Structures, Charotar Publication
2. Desai & Abel; Finite Element Method, Tata Mcgrawhill
3. S S Khandare; CAD Application
4. Shesa Prakash & suresh, Computer Aided Design Lab, Laxmi Publication.