CSI-SAP2000 Essentials for Structural Analysis

1. TARGET AUDIENCE:

This course is designed for civil engineering students, structural engineers, BIM engineers, CAD technicians, and professionals who want to master structural analysis and design using SAP2000 for real-world projects.

It is also beneficial for site engineers, consultants, infrastructure engineers, architects, and professionals transitioning into structural design and analysis workflows, especially those working with Indian Standards (IS Codes) and global design practices.

2. COURSE OBJECTIVE:

The objective of this course is to provide a complete understanding of structural modelling, analysis, and design workflows using SAP2000.

It focuses on developing analytical models of structures, applying realistic loads (dead, live, wind, seismic), performing linear and dynamic analysis, and designing structural elements as per IS codes (IS 456, IS 800, IS 1893). The course emphasizes practical implementation through real-world building projects and integration with BIM tools like Autodesk Revit.

3. COURSE OUTLINE:

The course comprises **24 hours of theory and hands-on practical training** and is divided into **09 modules**. Each module includes practical exercises and assignments covering structural modelling, load application, analysis, design, and a complete building project.

Module 1: Introduction to SAP2000

- Overview of structural analysis workflow
- SAP2000 interface (single integrated UI for modelling, analysis, design)
- Units, grids, coordinate system
- Starting a new model (templates vs blank)

Module 2: Basic Structural Modelling

- Object-based modelling (frame, shell basics)
- Drawing beams and columns
- Grid and snap tools
- Replication (copy, mirror, extrude)
- Assigning supports (fixed, pinned)

Module 3: Material & Section Properties

- Define concrete and steel materials
- Assign frame sections
- Section libraries (basic use)
- Introduction to Section Designer

Module 4: Load Definition & Assignment

- Load patterns (Dead, Live)
- Self-weight multiplier
- Assigning point loads and distributed loads
- Introduction to load cases

Module 5: Load Combinations

- Basic load combinations

- Service vs ultimate concept
- Manual combination creation

Module 6: Analysis Fundamentals

- Deformed shape
- Shear force & bending moment diagrams
- Reaction forces
- Displacement check

Module 7: Result Interpretation

- Code preferences and analysis setup
- Forces, deformation, and stress results
- Modal analysis

Module 8: Basic Design Introduction

- Introduction to design codes
- Basic beam design check
- Understanding design ratios

Module 9: Output & Reporting

- Display options (forces, diagrams)
- Tables and reports
- Export to Excel / reports