

## **Composite Program : 1) Master Study in Structures**

It will contain 4 modules:

Module 1: ETABS offers 3D object based modelling and visualization tools, fast linear and nonlinear analytical power, comprehensive design capabilities and insightful graphic displays, reports, and schematic drawings that allow users to quickly and easily decipher and understand analysis and design results.

Module 2: SAFE is tool used for designing concrete floor and foundation systems. From framing layout all the way through to detail drawing production, SAFE integrates every aspect of the engineering design process in one easy and intuitive environment.

Module 3: SAP2000 has proven to be the most integrated, productive and practical general purpose structural program on the market today. It is used for creating complex models and 3D object based graphical modelling environment to the wide variety of analysis and design options completely integrated across one powerful user interface.

Module 4: CSI BRIDGE, RCDC, PROKON, STAAD PRO

Modelling, analysis and design of bridge structures can be done in CSI Bridge which helps to create the ultimate in computerized engineering tools. RCDC is the industry leading concrete detailed engineering software. PROKON Structural Analysis and Design is a suite of over forty structural analysis, design and detailing programs. STAAD or (STAAD.Pro) is a structural analysis and design software application originally developed by Research Engineers International in 1997.

The detailed syllabus of above mentioned module has been included along with this document.

## **INTRODUCTION TO ETABS**

1. SOFTWARE ALGORITHM.
2. CAPABILITIES OF THE SOFTWARE.
3. STRENGTHS AND WEAKNESSES OF THE SOFTWARE.
4. ETABS MANUAL.
5. SIGNIFICANCE OF MENU BUTTONS AND ICONS.
6. SAMPLE MODELS AND TEMPLATES.
7. HANDS ON SOFTWARE ON SAMPLE TEMPLATES.

### **MODELING: PROCESS AND TECHNIQUES**

1. GEOMETRY CREATION PROCESS
2. MODELING THROUGH IMPORT METHOD: 2D IMPORT, 3D IMPORT
3. OTHER IMPORT TECHNIQUES.
4. PROPERTY ASSIGNMENT THROUGH AUTOMATION EXISTING TEMPLATES.
5. LOADINGS: DEAD, LIVE, WIND, EARTHQUAKE, TEMPERATURE, NOTIONAL, LIVE LOAD REDUCTION.
6. DETAILS OF WIND TUNNEL & ITS LOADINGS, STANDARDIZATION OF WIND MODEL & ETABS MODEL.
7. RELEASES, DIAPHRAGMS, ALL DEFINITION PARAMETERS.
8. CHECKS ON MODELING TECHNIQUES.
9. MODELING OF STEEL & COMPOSITE STRUCTURE
10. HANDS ON SOFTWARE TO PERFORM THE MODELING PROCESS AND TECHNIQUES.

### **ANALYSIS: PROCESS AND TECHNIQUES**

1. STATIC ANALYSIS
2. DYNAMIC ANALYSIS
3. SECOND ORDER P-DELTA ANALYSIS
4. SEQUENTIAL ANALYSIS
5. TIME HISTORY ANALYSIS
6. SIGNIFICANCE OF EACH ANALYSIS AND ITS USES.
7. CHECKS ON LATERAL STABILITY, DEFLECTION, STOREY DRIFT, TORSIONAL IRREGULARITY, MASS IRREGULARITY AND STIFFNESS IRREGULARITY.
8. HANDS ON SOFTWARE TO PERFORM THE ANALYSIS AND ITS CHECKS.

### **DESIGN: METHODS AND TECHNIQUES**

1. DESIGN OF COLUMNS AND BEAMS: METHODOLOGY & LIMITATIONS.
2. DESIGN OF COMPOSITE COLUMNS.
3. DESIGN OF WALLS & SLABS

## **ETABS ADVANCE**

### **INTRODUCTION, MODELLING PROCESS AND TECHNIQUES**

1. INTRODUCTION, CAPABILITIES, STRENGTHS & WEAKNESSES OF THE SOFTWARE
2. GEOMETRY CREATION PROCESS, IMPORT TECHNIQUES: 2D, 3D DXF, IFC, REVIT STR. IMPORT ETC.
3. SIMPLE COMMANDS IN ETABS TO REDUCE THE TIME REQUIRED FOR MODEL GENERATION.
4. COMBINED, COMPLEX MODELING OF BUILDING & FOUNDATION SYSTEM TOGETHER IN ETABS.
5. MULTIPLE TOWER MODELING IN ETABS, DESIGN OF SEPARATION JOINT.
6. LOADINGS: DL, LL, LL REDUCTION, TEMPERATURE LOADS, WIND LOADS (WITH PRESSURE COEFFICIENTS & GUST FACTOR) EARTHQUAKE LOADS: STATIC & DYNAMIC, CREEP, SHRINKAGE, ETC
7. AREA SPRINGS, POINT SPRINGS, RELEASES, SUPPORTS, DIAPHRAGMS, OTHER DEFINITION PARAMETERS.
8. OPTIMIZED ETABS MODEL FOR MIVAN TECHNOLOGY STRUCTURES. IT'S EFFECT ON DUCTILITY, DETAILING ETC.
9. HOW TO CHECK THE MATHAMATICAL MODEL IN ETABS?
10. PREANALYSIS CHECKS AND ANALYSIS.
11. STATIC & DYNAMIC EARTHQUAKE LOAD GENERATION, SCALE FACTOR, TIME PERIOD AND FREQUENCY CONCEPTS.

### **ANALYSIS: PROCESS AND TECHNIQUES.**

1. DIFFERENT TYPES OF ANALYSIS: LINEAR, NONLINEAR, SEQUENTIAL, STATIC, DYNAMIC ETC. USE OF SUCH ANALYSIS IN PRACTICAL PROJECTS, METHODOLOGY AND PARAMETERS.
2. OUTRIGGERS: ITS ADVANTAGES, DISADVANTAGES, HOW TO INCARPORATE IT IN MODELS AND IN DRAWINGS. ITS EFFECTS ON THE BUILDING- LOCALLY AND GLOBALLY.
3. GEOMETRIC AND MATERIAL NONLINEARITY EFFECT FOR THE BUILDINGS HAVING TRANSFER GIRDER.
4. DIFFERENCE BETWEEN EARTHQUAKE ENGINEERING AND WIND ENGINEERING. CONCEPTS, DESIGN AND DETAILING METHODOLOGIES ACCEPTED WORLDWIDE.
5. INTERNATIONAL NORMS FOR HIGHRISE BUILDING ANALYSIS AND DESIGN.
6. WIND TUNNEL ANALYSIS AND ITS USE IN HIGHRISE BUILDINGS.
7. HIGHRISE COMMITTEE NORMS, ITS STRUCTURAL SIGNIFICANCE, ITS OPTIMIZATION AND REPORTING.
8. WHY NONLINEAR ANALYSIS IS IMPORTANT FOR HIGHRISE BUILDINGS? WHEN TO PERFORM, HOW TO PERFORM AND WHAT ARE THE PARAMETERS TO CONSIDER IT PRACTICALLY.

9. MODAL ANALYSIS: STUDY AND ITS USE IN MODEL DYNAMICS TIME HISTORY ANALYSIS.
10. ENERGY V/S WORK DIAGRAMS. ITS APPLICATION AND USE.
11. MODELING OF COMPOSITE STRUCTURE, ANALYSIS AND DESIGN TECHNIQUES.
12. LATERAL STABILITY CHECKS: DRIFTS, DEFLECTIONS, STRESS LIMITS, CRACK WIDTHS, SERVICEABILITY CHECKS.

#### **DESIGN OF STRUCTURAL ELEMENTS**

1. DESIGN OF COLUMNS, BEAMS, SLABS, SHEARWALLS, TRANSFER SLABS AND BRACE ELEMENTS.
2. STRUCTURAL DESIGN OPTIMIZATION.
3. FOUNDATION SYSTEM.
4. SOIL STRUCTURE INTERACTION.
5. PILE & RAFT FOUNDATION OPTIMISATION TECHNIQUES.
6. CHECKING OF FOUNDATION SYSTEMS.

##### a. DEFLECTION

- SHORT TERM DEFLECTION
- LONG TERM DEFLECTION CONSIDERING CREEP.

##### b. CRACK WIDTH

##### c. REINFORCEMENT CHECKING, ETC.

DIFFERENTIAL SETTLEMENT OF FOUNDATION & ITS CONTROL.

## **SAFE SYLLABUS**

### **INTRODUCTION: THEORY**

1. SOFTWARE ALGORITHM.
2. CAPABILITIES OF THE SOFTWARE.
3. STRENGTHS AND WEAKNESSES OF THE SOFTWARES.
4. SAFE MANUAL
5. SIGNIFICANCE OF MENU BUTTONS AND ICONS.
6. SAMPLE MODELS AND TEMPLATES.
7. HANDS ON EXPERIENCE ON SAMPLE TEMPLATES.

### **MODELLING: PROCESS AND TECHNIQUES**

1. GEOMETRY CREATION PROCESS
2. MODELING THROUGH IMPORT METHOD: 2D IMPORT, 3D IMPORT
3. COMBINED, COMPLEX FOUNDATION SYSTEM
4. MODELING OF FOUNDATIONS, BASEMENTS, FOOTINGS AND FLAT SLABS.
5. PROPERTY ASSIGNMENT OF RIGDE ZONES FOR WALLS AND RAMPS.
6. USAGE OF INSERTION POINT FOR BEAMS AND COLUMNS.
7. PROPERTY ASSIGNMENT FOR SPRING SUPPORTS.
8. USES OF DESIGN STRIPS.
9. DEFINITION OF POST-TENSIONING IN SLABS.
10. TENDON LOAD AND ITS LOSSES.
11. LOADING: DEAD, LIVE, WIND, EARTHQUAKE, TEMPERATURE, NOTIONAL, LIVE LOAD REDUCTION.
12. RELEASES, SUPPORTS, DIAPHRAGMS, ALL DEFINITION PARAMETERS.
13. CHECKS ON MODELING TECHNIQUES.

### **ANALYSIS: PROCESS AND TECHNIQUES**

1. INTERACTION BETWEEN ETABS AND SAFE.
2. SOIL STRUCTURE AND INTERACTION.
3. CHECKS ON FOUNDATION SYSTEM

1. DEFLECTION.

1. SHORT TERM DEFLECTION.
2. LONG TERM DEFLECTION CONSIDERING CREEP.
2. CRACK WIDTH.
3. PUNCHING SHEAR.
  
1. ONE WAY SHEAR
2. TWO WAY SHEAR.
  
4. REINFORCEMENT CHECKS.
4. DIFFERENTIAL SETTLEMENT OF FOUNDATION AND ITS CONTROL.
5. NON LINEAR ANALYSIS BY CONSIDERING LONG TERM CREEP.
6. NON LINEAR ANALYSIS FOR CRACKED CONDITIONS.
7. ANALYSIS OF FLAT SLAB.
8. CHECKS ON FOUNDATION SYSTEM AND FLAT SLABS AGAINST LATERAL FORCES (STATIC/DYNAMIC).
9. SIGNIFICANCE OF EACH ANALYSIS AND ITS USES USING VARIOUS CODES.

**DESIGN: METHODS AND TECHNICAL**

1. DESIGN OF STIRRUPS.
2. DESIGN OF SLABS BASED ON FINITE ELEMENT METHOD.
3. DESIGN OF RAFT & PILE FOUNDATIONS.
4. DESIGN METHODOLOGY.
5. DESIGN OF PUNCHING SHEAR REINFORCEMENT (STUD RAILS).
6. FLAT SLABS WITH POST TENSIONING.
7. CHECKS ON POST TENSIONING STRESS.
8. GENERATING OUTPUT & DISPLAY OF DEFORMED GEOMETRY.
9. DETAILING & REPORTING TECHNIQUES.
10. CODES & SOFTWARE INTERACTION BY CONSIDERING NATIONAL & INTERNATIONAL CODES.

## **SAP2000-SYLLABUS**

### **INTRODUCTION: THEORY**

1. SOFTWARE ALGORITHM.
2. CAPABILITIES OF THE SOFTWARE.
3. STRENGTHS AND WEAKNESSES OF THE SOFTWARE.
4. SAP2000 MANUAL.
5. SIGNIFICANCE OF MENU BUTTONS AND ICONS

### **MODELLING: PROCESS AND TECHNIQUES**

1. CREATION OF GEOMETRY FOR BEAMS.
2. CREATION OF SLOPED, VERTICAL & PRATT TRUSS.
3. COMBINED, COMPLEX MODELING OF ROOF TRUSS, TRANSMISSION TOWER & GUYED TOWER.
4. MODELING OF PORTAL, BRACED (CONCENTRIC & ECCENTRIC) FRAMES.
5. MODELING OF OPEN FRAME BUILDING, PERIMETER FRAME BUILDING, AND BEAM SLAB BUILDING FRAMES.
6. MODELING OF FLAT SLABS AND WALLS.
7. COMPLEX MODELING OF CYLINDER, BARREL SHELL, MULTI BAY CYLINDRICAL SHELL, HYPERBOLIC, PARABOLOID, PARTIAL SPHERE, SPHERICAL DOME, PARABOLIC DOME.
8. CREATION OF DOG LEGGED & SPIRAL STAIRCASES.
9. MODELLING OF OVERHEAD TANK, UNDERGROUND TANK & STORAGE SILOS.
10. CREATION OF GEOMETRY FOR COMPLEX THICK ARCH, VARIABLE ARCH, PRISM & BLOCK MODELS.
11. CREATION OF TUBES, PLATES, PIPES & CONNECTION TEMPLATES.
12. LOADING: DEAD, SUPER DEAD, LIVE, WIND, EARTHQUAKE & LIVE LOAD REDUCTION.
13. RELEASES, SUPPORTS, DIAPHRAGMS, ALL DEFINITION PARAMETERS.
14. CHECKS ON MODELING TECHNIQUES.

### **ANALYSIS: PROCESS AND TECHNIQUES**

1. INTERACTION BETWEEN AUTOCAD AND SAP2000.
2. CHECKS ON UNDERGROUND STRUCTURES.
  1. DEFLECTION
    1. SHORT TERM DEFLECTION.
    2. PRESSURE BULB FOR T/C REINFORCEMENT.
  2. CRACK WIDTH.
  3. REINFORCEMENT CHECKS.
3. LINEAR & NON LINEAR STATIC ANALYSIS.
4. NON LINEAR, STAGGERED, STATIC CONSTRUCTION ANALYSIS.
5. SIGNIFICANCE OF EACH ANALYSIS AND ITS USES USING VARIOUS CODES.

#### **DESIGN: METHODS AND TECHNIQUES**

1. DESIGN OF STEEL STRUCTURES.
2. DESIGN OF CONCRETE STRUCTURES.
3. OUTPUT & DISPLAY OF DEFORMED GEOMETRY.
4. DETAILING & REPORTING TECHNIQUES.
5. CODES & SOFTWARE INTERACTION BY CONSIDERING NATIONAL & INTERNATIONAL CODES.



## **CSI BRIDGE SYLLABUS**

### **INTRDUCTION TO THE SOFTWARE**

1. SOFTWARE ALGORITHM.
2. CAPABILITIES OF THE SOFTWARE.
3. STRENGTHS AND WEAKNESSES OF THE SOFTWARE.
4. CSI BRIDGE MANUAL.
5. SIGNIFICANCE OF MENU BUTTONS AND ICONS.
6. SAMPLE MODELS AND TEMPLATES.
7. HANDS ON SOFTWARE ON SAMPLE TEMPLATES

### **MODELING: PROCESS AND TECHNIQUES**

1. CREATE A CONCRETE BOX GIRDER BRIDGE
2. BRIDGE WIZARD
3. LAYOUT LINE
4. DECK SECTION
5. BRIDGE OBJECT
6. PARAMETRIC VARIATION
7. BRIDGE OBJECT ASSIGNMENT
8. LOAD THE BRIDGE MODEL

### **ANALYSIS: PROCESS AND TECHNIQUES**

1. BRIDGE RESPONSES
2. RUN ANALYSIS
3. DISPLAY RESULTS

i. GRAPHICAL DISPLAYS

ii. OUTPUT TABLES

## **RCDC SYLLABUS**

### **INTRDUCTION TO THE SOFTWARE**

1. SOFTWARE ALGORITHM.
2. CAPABILITIES OF THE SOFTWARE.
3. STRENGTHS AND WEAKNESSES OF THE SOFTWARE.
4. CSI BRIDGE MANUAL.
5. SIGNIFICANCE OF MENU BUTTONS AND ICONS.
6. SAMPLE MODELS AND TEMPLATES.
7. HANDS ON SOFTWARE ON SAMPLE TEMPLATES

### **MODELING: PROCESS AND TECHNIQUES**

1. CREATE A CONCRETE BOX GIRDER BRIDGE
2. BRIDGE WIZARD
3. LAYOUT LINE
4. DECK SECTION
5. BRIDGE OBJECT
6. PARAMETRIC VARIATION
7. BRIDGE OBJECT ASSIGNMENT
8. LOAD THE BRIDGE MODEL

### **ANALYSIS: PROCESS AND TECHNIQUES**

1. BRIDGE RESPONSES
  2. RUN ANALYSIS
  3. DISPLAY RESULTS
- GRAPHICAL DISPLAYS
  - OUTPUT TABLES

## **PROKON SYLLABUS**

### **INTRODUCTION: THEORY**

1. SOFTWARE ALGORITHM.
2. CAPABILITIES OF THE SOFTWARE.
3. STRENGTHS AND WEAKNESSES OF THE SOFTWARES.
4. PROKON MANUAL
5. SIGNIFICANCE OF MENU BUTTONS AND ICONS.
6. SAMPLE MODELS AND TEMPLATES.
7. HANDS ON EXPERIENCE ON SAMPLE TEMPLATES

### **ANALYSIS AND DESIGNING: PROCESS AND TECHNIQUES - FOR INDIVIDUAL ELEMENTS**

1. GOMETRY CREATION PROCESS
2. DESIGNING OF REINFORCED CONCRETE STRUCTURAL ELEMENTS
3. DESIGNING OF COMPLEX STRUCTURAL ELEMENTS
4. PROPERTY ASSIGNMENTS
5. LOADING: DEAD, LIVE, WIND, EARTHQUAKE, TEMPERATURE, NOTIONAL, LIVE LOAD REDUCTION
6. DESIGNING OF STEEL TRUSSES
7. STEEL CONNECTION DESIGN - BASE PLATES, GUSSET PLATE
8. DESIGNING OF TIMBER STRUCTURAL ELEMENTS
9. HANDS ON SOFTWARE TO PERFORM THE DESIGN PROCESS AND TECHNIQUES

## **A. INTRODUCTION TO BIM TECHNOLOGY:**

- What is BIM and how does BIM technology works?
- BIM technologies.
- The BIM model.
- How to get the effective output from BIM model.
- Hands on software on sample templates.

## **B. 2D:AUTOCAD**

### **➤ INTRODUCTION TO AUTOCAD**

- AutoCAD Screen Components
- Invoking Commands in AutoCAD
- AutoCAD Dialog Boxes
- Starting a New Drawing
- Saving Your Work
- Save Drawing as Dialog box
- Closing a Drawing
- Opening an Existing Drawing
- Quitting AutoCAD
- Creating and Managing Workspaces

### **➤ GETTING STARTED WITH AUTOCAD**

- Dynamic Input Mode
- Drawing Lines in AutoCAD
- Invoking tools Using Dynamic INPUT/Command
- Prompt Coordinate Systems
- Object Selection Methods
- Setting Units Type and Precision
- SETTING the Limits OF A DRAWING

### **➤ STARTING WITH ADVANCED SKETCHING**

- Drawing Arcs
- Drawing Rectangles
- Drawing Ellipses
- Drawing Regular
- Polygon Drawing
- Polylines
- Placing Points

- Drawing Infinite Lines
- Writing a Single Line Text

➤ **WORKING WITH DRAWING AIDS**

- Understanding the Concept and use of LAYERS
- Working with Layers
- Object Properties
- Drafting Settings dialog box
- Drawing Straight Lines using the Ortho Mode
- Working with Object Snaps
- Running Object Snap Mode
- Using Auto Tracking
- Function and Control Keys

➤ **EDITING SKETCHED OBJECTS-I**

- Editing Sketches
- Moving the Sketched Objects
- Copying the Sketched Objects
- Arraying the Sketched Objects
- Mirroring the Sketched objects

➤ **EDITING SKETCHED OBJECTS-II**

- Introduction to Grips
- Types of Grips
- Managing Contents Using the Design enter
- Zooming Drawings
- Panning Drawings

➤ **CREATING TEXT AND TABLES**

- Annotative Objects
- Annotation Scale
- Multiple Annotation Scales
- Controlling the Display of Annotative objects
- Creating Text
- Entering Special Characters
- Creating Multiline Text
- Editing Text
- Inserting Table in the Drawing
- Creating a New Table Style

- **BASIC DIMENSIONING, GEOMETRIC DIMENSIONING, AND TOLERANCING**
- **EDITING DIMENSIONS**
- **DIMENSION STYLES, MULTILEADER STYLES, AND SYSTEM VARIABLES**
- **MODEL SPACE VIEWPORTS, PAPER SPACE VIEWPORTS, AND LAYOUTS**
- **PLOTTING DRAWINGS**
- **HATCHING DRAWINGS**
- **WORKING WITH BLOCKS**
- **AutoCAD 3D:** Extrusion, Isometric Drawings, Isometric commands.

## 2. **3D:REVIT/ARCHICAD:**

### **2.1: REVIT:**

- **INDUSTRIES: REVIT BENEFIAL FOR:**
  - ARCHITECTURAL DESIGN
  - STRUCTURAL ENGINEERING
  - MEP ENGINEERING
  - CONTRUCTION
- **FEATURES WITH SPECIFICATION:**
  - A. **ARCHITECTURAL DESIGN:**
    - Conceptual design tools
    - Analysis with Insight
    - Architectural modelling
    - Point cloud tools
    - 3D design visualization
    - Multi-storey stairs
    - Cloud rendering
  - B. **STRUCTURAL ENGINEERING AND FABRICATION:**
    - Physical and analytical model
    - Reinforcement detailing
    - Structural steel modelling
    - Structural documentation
    - Bidirectional linking with analysis
    - Linking with structural fabrication
    - Dynamo for structural engineering

### C. MEP ENGINEERING AND FABRICATION:

- HVAC design and documentation
- Electrical design and documentation
- Plumbing design and documentation
- MEP fabrication detailing
- Insight integration
- Fabrication service conversion
- Fabrication documentation

### D. CONSTRUCTION:

- Construction modelling
- Construction coordination
- Navisworks interoperability
- Import/Export 2D sheets
- Constructability details
- Fabrication for structural engineering
- Fabrication for MEP engineering

## 2.2: ARCHICAD:

- **ARCHICAD Theory:** Principles of ARCHICAD and working methods.
- **ARCHICAD workspace:** Palettes and tool-bars, origin, scale, preferences.
- **Project Setup:** Stories, Layers, file types, autosave function.
- **Attributes:** Creating attributes, Building Materials, Composites and Surfaces.
- **Element placement and selection:** Walls, slabs, windows, doors.
- **Element settings and editing:** Walls, slabs, windows, doors.
- **Roof Tool:** Different methods of roof creation and editing.
- **Navigator:** Explanation of Project map, View map, Layout Book and Publisher sets.
- **Views:** Understanding all the stored settings for views
- **Sections and Elevations:** Setting up viewpoint and controls.
- **Grid Tool:** Configuring grids and settings for different views.
- **Details:** Detail Markers and links to model. Level of Detail control in model.
- **Dimensioning:** Dimension chains and model associativity.
- **Stair Tool:** Configuring Stair tool.
- **Meshes:** Methods for creating meshes, gravity.
- **External Content:** Bringing data from external sources into ARCHICAD.

- **Documentation.**

### **3. PROJECT MANAGEMENT SOFTWARE-BAR CHART, ESTIMATION & COSTING USING DIFFERENT TECHNOLOGIES.**

- Scheduling a project plan
- Configuring project management software.
- Managing project resources.
- Establishing project baselines for performance.
- Planning & controlling the project.
- Use of BIM & excel in estimation & costing.
- Rate analysis, DSR its application for tendering.
- Estimation thumb rules & through BBS.
- Estimated and projected costing.
- Investment vs. Rate of return Ratio (IRR).
- Profitability vs. Investment Charts.
- Critical Path Methods and Project Evaluation & Review Technique.
- Comparison between CPM and PERT.

### **4. 4D: TIME MANAGEMENT: NAVISWORKS:**

#### **➤ GETTING STARTED:**

- Getting Started with Autodesk Navisworks
- Publishing, Merging, Refreshing, and Emailing Files
- Selection Tree and Selecting Objects

#### **➤ 3D MODEL REVIEW:**

- Hiding Objects and Overriding Materials
- Object Properties
- Measuring and Moving Objects
- Selection and Search Sets
- Viewpoints
- Comments, Redlining, and Tabs
- Animations
- Sectioning
- Links
- Comparing Models
- Navisworks Real-Time Rendering
- Switchback



➤ **TIMELINER:**

- TimeLiner Overview
- Creating Tasks
- Gantt View
- Import Tasks from External Project File
- Configuring and Defining a Simulation
- Simulation Export

➤ **ANIMATOR:**

- Animator Overview
- Creating a Basic Animation
- Manipulate Geometry Objects in an Animation Set
- Section Plane Sets
- Controlling Animation Scene Playback

➤ **SCRIPTER:**

- Scripter Overview
- Creating and Managing Scripts
- Creating and Configuring Events
- Creating and Configuring Actions

➤ **QUANTIFICATION:**

- Quantification Overview
- Setting up a Quantification Project
- Item and Resource Management
- 3D Model and Virtual Takeoff
- Managing Takeoff Data
- 2D Takeoffs
- Analyzing Changes
- Exporting Takeoff Data

➤ **CLASH DETECTIVE:**

- Clash Detective Overview
- Clash Results
- Clash Test Reporting
- Working with Clash Tests

- Audit Checks
- Exporting and Importing Clash Tests
- Laser Scan Data Clashing
- Method for Testing and Resolving Clashes
- Time-Based Clashing

➤ **AUTODESK RENDERING:**

- Autodesk Rendering Overview
- Adding Materials to a Model
- Creating and Editing Materials
- Material Mapping
- Lighting
- Sun and Sky Lights
- Exposure Control
- Ground Planes
- Photorealistic Rendering

5. **5D:COST ESTIMATION:**

- **MANUAL ESTIMATION:** Corresponding to Material take-offs.
- **WITH THE HELP OF QUANTIFICATION OF NAVISWORKS AND REVIT SOFTWARE.**
- **VALUE ENGINEERING.**
- **PROOF CHECKING.**
- **REAL TIME CONCEPTUAL MODELLING AND COST PLANNING.**

6. **6D: ENERGY MODEL:**

- **LIGHTING ANALYSIS.**
- **SOLAR ANALYSIS.**
- **HEATING & COOLING ANALYSIS.**

- **ENERGY ANALYSIS.**

**7. 7D: FACILITY MANAGAEMENT:**

- **CREATE LIFE-CYCLE BIM STRATEGIES**
- **DOCUMENTATION AND MANAGE THE LIFE-CYCLE**
- **BIM EMBEDDED Q&M MANUALS**
- **BIM MAINTENANCE PLANS AND TECHNICAL SUPPORT**

**8. ADVANCE PROJECT MANAGEMENT APPROCHES.**

- PMI
- PRINCE 2
- SDLC
- AGILE