NAAN MUDHALVAN – POLYTECHNIC – ODD SEMESTER 2025-26

COURSE CURRICULUM

CONSTRUCTION COST ESTIMATION

ABOUT THE COURSE

This course is designed to provide students with industry-relevant, hands-on expertise in construction cost estimation, utilizing both Microsoft Excel and CostX software. The training covers topics from estimation principles to advanced 2D and 3D BIM-based cost modelling. The students will gain the ability to perform quantity takeoff from technical drawings, automate estimates with Excel macros, develop Bills of Quantities (BOQs), and generate custom cost reports.

COURSE NAME:	Construction Cost Estimation
TOTAL DURATION:	60 HRS
MODE OF DELIVERY	PHYSICAL CLASSROOM TRAINING AT RESPECTIVE COLLEGES
TRAINER TO STUDENT RATIO:	1:60
TOTAL MARKS:	70 (External) + 30 (Internal)

Table 1: COURSE OBJECTIVE AND OUTCOMES	
OVERALL COURSE OBJECTIVE	Develop comprehensive skills in construction cost estimation using Excel and CostX software by covering foundational principles, advanced cost analysis techniques and quantity take- off.
LEARNING OUTCOMES	• Analyse the fundamentals of construction estimation, including rate analysis and spreadsheet operations, and apply Excel formulas for basic quantity and cost calculations. • Develop and manage automated Excel-based cost estimation templates for various construction activities, and perform detailed cost analysis using visual dashboards and macros. • Perform accurate quantity takeoff from 2D drawings in CostX and generate linked cost estimates using rate libraries and workbook integration. • Execute 3D BIM-based cost estimation in CostX by extracting quantities from intelligent model elements and organizing them into structured workbooks. • Apply advanced features of CostX for preparing BOQs,

	generating custom reports, managing rate libraries, and executing real-world estimation case studies in collaborative environments.

TABLE 2: MODULE WISE COURSE CONTENT AND OUTCOME				
S. No.	**Module Name**	**Module Content**	**Module Learning Outcome**	**Duration (Hrs)**
1	Fundamentals of Cost Estimation and Excel Basics	Basics of Construction Estimation – Types of Estimates – Units of measurement –Schedule of Rates – Components of rate analysis – Classification of costs – Spreadsheet structure – Excel formulae and functions – Formatting cost sheets, tables and conditional formatting – Filters, Data validation and dropdowns – Dimensions, Quantity and Rate input – Formula linking between quantity sheets	Analyse the fundamentals of construction estimation, including rate analysis and spreadsheet operations	12
2	Advanced Cost Analysis using Excel	Creating estimation templates – Quantity Take-off for Earthwork, Concrete, Masonry, and Finishes – Cost breakdown by items – Structuring floor-wise, work-type-wise, component-wise – Automating	Develop and manage automated Excel- based cost estimation templates for various construction activities, and perform detailed cost analysis using visual dashboards and macros.	12

		estimation tasks using Macros – Cost estimation summary – Comparative cost analysis for alternatives – Visual Excel dashboards – Formatting and Print setup		
3	CostX: 2D Drawing Quantity and Cost Estimation	CostX Interface, Navigation and Tools - Import 2D Drawings – Drawing Scales and Gridlines – Drawing calibration – Levels and Zones – Layer Management – Linear, Area, and Count Measurement Tools – Groups and Filters – Linking Measurements to Workbooks – Rate Libraries – Quantity and Cost Reports	Perform accurate quantity takeoff from 2D drawings in CostX and generate linked cost estimates using rate libraries and workbook integration.	12
4	CostX: 3D Bim Model Quantity and Cost Estimation	Import 3D models – Filter and classify components – Auto-detect quantities from model geometry – Take-off from model properties – Isolate elements – Filter by category, material – Multi-Level/Zone Estimating – Linked Workbook	Execute 3D BIM-based cost estimation in CostX by extracting quantities from intelligent model elements and organizing them into structured workbooks.	12

5	CostX: Advanced Features	Bill of Quantities Preparation – BOQ sorting by Levels, Work Packages and WBS – Create and Manage Rate Libraries, Cost Assemblies – Generate Custom Reports – Export formats – CostX Macros and Automation Tools – Team Collaboration – Multi-user Workflows – Integration with other software tools	Apply advanced features of CostX for preparing BOQs, generating custom reports, managing rate libraries, and executing real-world estimation case studies in collaborative environments.	12

TABLE 3: OVERALL COURSE LEARNING OUTCOME ASSESSMENT CRITERIA AND USECASES		
LEARNING OUTCOME	**ASSESSMENT CRITERIA**	**USE CASES**
Analyse the fundamentals of construction estimation, including rate analysis and spreadsheet operations, and apply Excel formulas for basic quantity and cost calculations.	Practical Assessment - Evaluate understanding of estimation components and Excel usage	**Use Case:** Creating a formatted estimation sheet for a small construction activity **Scenario:** Estimating the cost of a residential compound wall using Excel functions **Task:** Build a rate analysis spreadsheet with quantity inputs, linked formulas, and formatted outputs
Develop and manage automated Excel-based cost estimation templates for various construction activities, and perform detailed cost analysis using visual dashboards and macros.	Practical Assessment - Assess ability to automate estimation and visualize data	**Use Case:** Automating multi-floor building estimation in Excel **Scenario:** Use macros and dashboards to estimate and compare G+2 residential structure costs **Task:** Develop a floor-wise automated estimation sheet with macros and a comparative dashboard

Perform accurate quantity takeoff from 2D drawings in CostX and generate linked cost estimates using rate libraries and workbook integration.	Practical Assessment - Test precision in measuring quantities and linking to CostX workbook	**Use Case:** Performing cost take-off from imported 2D structural drawings **Scenario:** Import a 2D RCC slab layout, measure areas, and link to rate workbook **Task:** Use CostX tools to extract slab quantities and calculate costs using a rate library
Execute 3D BIM-based cost estimation in CostX by extracting quantities from intelligent model elements and organizing them into structured workbooks.	Practical Assessment - Verify ability to extract intelligent quantities from BIM	**Use Case:** Estimating concrete quantities from a 3D BIM model **Scenario:** Import a Revit 3D model, filter structural elements, and isolate footings **Task:** Auto-extract volume of isolated footings and organize data in a multi-zone workbook
Apply advanced features of CostX for preparing BOQs, generating custom reports, managing rate libraries, and executing real-world estimation case studies in collaborative environments.	Practical Assessment - Check advanced usage in BOQ creation and multi- user workflows.	**Use Case:** Collaboratively generating BOQ for a commercial complex **Scenario:** Teamwork-based project for BOQ preparation with WBS hierarchy and report exports **Task:** Create a detailed BOQ with work package grouping, custom rate libraries, and exportable reports.

TABLE 4: LIST OF FINAL TEST PROJECTS (20 PROJECTS THAT COMPREHENSIVELY COVER ALL THE LEARNING OUTCOMES)	
S. No.	**FINAL PROJECT (The Training Partner shall cover all the steps to complete a given project)**
1.	Create a cost estimation sheet in Excel for a small residential unit (G+1)
2.	Rate Analysis and Cost Sheet Preparation for RCC Structure Using Excel
3.	Create a comparative dashboard in Excel to analyze and visualize the cost difference between two structural design options
4.	Multi-Storey Office Building Cost Analysis with Visual Dashboards in Excel

5.	Perform linear and area-based quantity takeoff for walls and flooring importing a 2D floor plan into CostX
6.	Generate a complete cost estimate report using workbooks in CostX.
7.	Import a 3D BIM model into CostX, classify components and auto-extract quantities of components.
8.	Slab and Beam Concrete Quantity Extraction from 3D BIM Model Using CostX
9.	Prepare a Bill of Quantities (BOQ) for a multi-storey building using CostX
10.	Integrated Cost Estimation Workflow for Warehouse Construction
11.	2D Quantity Takeoff and Estimation of a Hospital Building Using CostX
12.	Work-Type-Wise Estimation Report Generation Using Excel Templates
13.	BOQ Preparation and WBS Sorting for an Industrial Building
14.	Macro-Based Estimation Automation in Excel for Foundation Works
15.	Quantity Takeoff and Rate Analysis for Concrete Elements in a Multistorey Building
16.	Comparative Cost Estimation of Different size of reinforcement
17.	3D BIM-Based Cost Estimation Using CostX for Office Complex
18.	Excel Dashboard for Monitoring Construction Material Costs Across Phases
19.	Cost Breakdown of Plumbing and Sanitary Systems in a Residential Building
20.	Comparative Costing of different types of bricks and blocks for walls in a building

TABLE 5: COURSE ASSESSMENT RUBRICS (TOTAL MARKS = 70)

ASSESSMENT CRITERIA	FAIR (50 – 64%)	GOOD (65 – 79%)	EXCELLENT (80 – 100%)	TOTAL MARKS
Analyse the fundamentals of construction estimation, including rate analysis and spreadsheet operations, and apply Excel formulas for basic quantity	Demonstrates limited hands-on ability; requires frequent guidance; basic tool use only.	Performs most practical tasks with minor errors; uses tools independently with moderate confidence.	Shows complete command of tools and tasks; executes practical components with precision and autonomy.	10

and cost calculations.				
Develop and manage automated Excel-based cost estimation templates for various construction activities, and perform detailed cost analysis using visual dashboards and macros.	Basic understanding of concepts; struggles to apply them in practical settings.	Good grasp of concepts; can relate theory to practice with moderate accuracy.	Deep understanding of principles; consistently applies theory to solve real-world problems effectively.	10
Perform accurate quantity takeoff from 2D drawings in CostX and generate linked cost estimates using rate libraries and workbook integration.	Delivers incomplete or disorganized project; lacks planning and structure	Delivers functional project with logical structure and timely completion.	Executes projects efficiently with high quality, innovation, and adherence to requirements.	10
Execute 3D BIM-based cost estimation in CostX by extracting quantities from intelligent model elements and organizing them into structured workbooks.	Delivers incomplete or disorganized project; lacks planning and structure	Delivers functional project with logical structure and timely completion.	Executes projects efficiently with high quality, innovation, and adherence to requirements.	20
Apply advanced features of CostX for preparing BOQs, generating custom reports, managing rate libraries, and	Demonstrates limited hands-on ability; requires frequent guidance; basic tool use only.	Performs most practical tasks with minor errors; uses tools independently with moderate confidence.	Shows complete command of tools and tasks; executes practical components with precision and autonomy.	20

executing real-world estimation case studies in collaborative environments.				
Total				**70**

Technical Specification

S. No.	Details	Specifications
1	Software/Tools used	**1. Autodesk Quantity Takeoff / - V2013** **2. MS Excel** **3. Bluebeam – V2024**
2	Certification	TANCAM powered by Dassault Certification