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|------------------------------|------------------------------------------------------------------------------|
| <b>Branch Name:</b>          | Civil Engineering                                                            |
| <b>Semester:</b>             | VI                                                                           |
| <b>Course Code:</b>          | BIM601                                                                       |
| <b>Course Name:</b>          | Quantity Take-Off and Estimation using BIM Tools                             |
| <b>Pre-requisite Course:</b> | Fundamentals of Construction Estimation, Detailed knowledge of BIM and Revit |

### Course Objective

- The course is designed to introduce students to digital methods for quantity take-off and estimation using Building Information Modeling (BIM) tools.
- It provides both theoretical foundations and practical skills to extract quantities and perform cost analysis directly from BIM models.

| Teaching Scheme (hours) |          |           |        | Evaluation Scheme (Marks) |                       |                       |                       |       |
|-------------------------|----------|-----------|--------|---------------------------|-----------------------|-----------------------|-----------------------|-------|
| Lecture                 | Tutorial | Practical | Credit | Theory                    |                       | Practical             |                       | Total |
|                         |          |           |        | University Assessment     | Continuous Assessment | University Assessment | Continuous Assessment |       |
| 2                       | --       | 6         | 5      | 30                        | 20                    | 50                    | 50                    | 150   |

| Sr. No | Topic                                                                                                                                                                                                   | Teaching Hrs. | Module Weightage |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|
| 1      | <b>Module 1: Introduction to Estimation in BIM Environment</b>                                                                                                                                          | 04            | 10               |
|        | Traditional vs. BIM-based estimation, Overview of BIM tools used for estimation, Levels of Development (LOD) and its impact on estimation accuracy                                                      |               |                  |
| 2      | <b>Module 2: Quantity Take-Off from Revit Models</b>                                                                                                                                                    | 08            | 10               |
|        | Creating and customizing schedules in Revit, Extracting quantities for architectural, & structural, Filtering, sorting, and grouping in schedules, schedule categories.                                 |               |                  |
| 3      | <b>Module 3: Material Take-off &amp; Material Library</b>                                                                                                                                               | 12            | 15               |
|        | Generating material schedules for architectural and structural elements, Filtering, sorting, and grouping in schedule, Material Library management                                                      |               |                  |
| 4      | <b>Module 4: Schedule Formatting &amp; Application</b>                                                                                                                                                  | 15            | 20               |
|        | Filters; sorting/grouping; calculated fields; legends; formatting schedules. Using schedules for QA/QC; cross-checking with model and drawings.                                                         |               |                  |
| 5      | <b>Module 5: Visualization and Collaboration</b>                                                                                                                                                        | 12            | 15               |
|        | Rendering basics, materials, and lighting, Walkthrough and camera views, Collaboration tools: Work-sharing and overview of cloud-based BIM, Clash detection overview and coordination                   |               |                  |
| 6      | <b>Module 6: Case Study &amp; Mini Project</b>                                                                                                                                                          | 12            | 25               |
|        | Hands-on project: Extracting quantities and estimating a residential or commercial project, Preparing BOQ (Bill of Quantities), cost sheets, and summary reports, Presentation of cost estimation model |               |                  |

## **Course Outcome**

At the end of this course, the student will be able to

1. Understand the workflow of quantity take-off and estimation in BIM tools.
2. Generate material and component quantities using Revit.
3. Perform basic to intermediate level cost estimation using BIM-integrated workflows.
4. Integrate Revit models with Excel and other Project management software.
5. Apply 5D BIM concepts for cost and construction planning.

## **Scope of Course**

- Prepares students for roles in quantity surveying, cost management, and BIM coordination.
- Offers foundational knowledge for 5D BIM implementation in industry projects.
- Enhances employability in construction consulting and contracting firms.
- Suitable for professionals preparing for certifications like Certified Quantity Surveyor or Autodesk BIM certifications.

## **Suggested Practical's**

### **Module 1: Introduction to Estimation in BIM Environment**

1. Compare traditional vs. BIM-based estimation workflows with a sample project.
2. Demonstrate Levels of Development (LOD) and their effect on estimation accuracy.

### **Module 2: Quantity Take-Off from Revit Models**

3. Create custom schedules in Revit for walls, floors, and doors.
4. Extract architectural quantities (e.g., room areas, floor finishes).
5. Extract structural quantities (e.g., beams, columns, slabs).
6. Apply filtering, sorting, and grouping to refine schedules.

### **Module 3: Material Take-Off & Material Library**

7. Generate a material take-off schedule for walls, windows, and roofs.
8. Develop a material schedule for structural elements (concrete, steel).
9. Manage and edit the Revit Material Library with customized materials.
10. Create categorized reports for material usage.

### **Module 4: Schedule Formatting & Application**

11. Apply filters, grouping, and calculated fields in schedules.
12. Cross-check schedules against drawings/models for accuracy (QA/QC).
13. Create formatted BOQ sheets with legends and conditional formatting.
14. Export schedules from Revit to Excel for cost analysis.

### **Module 5: Visualization & Collaboration**

15. Produce renderings with applied materials and lighting.
16. Create a walkthrough video of the modeled project for client presentation.
17. Use collaboration tools (work-sharing in Revit/Autodesk BIM 360).
18. Perform a basic clash detection and summarize results.

**Module 6: Case Study & Mini Project**

19. Study an industry project where BIM was used for cost estimation.
20. Develop a residential/commercial BIM model and extract quantities.
21. Prepare a complete Bill of Quantities (BOQ) with formatted cost sheets.
22. Generate a summary report integrating Revit + Excel workflows.
23. Present the cost estimation model with visualizations and documentation.