

**COURSE NAME : Civil Engineering Group**  
**COURSE CODE : CE/CR/CV/CS**  
**SEMESTER/YEAR : Fifth for CE/CS/CR and Sixth for CV**  
**SUBJECT TITLE : Estimating and Costing**  
**SUBJECT CODE :**

**Teaching and Examination Scheme:**

| Teaching Scheme |    |    | Examination Scheme |     |    |     |     |       |
|-----------------|----|----|--------------------|-----|----|-----|-----|-------|
| TH              | TU | PR | PAPER HRS.         | TH  | PR | OR  | TW  | TOTAL |
| 03              | -- | 04 | 04                 | 100 | -- | 25# | 25@ | 150   |

**@ Internal Assessment, # External Assessment, \* Online Examination**

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

**RATIONALE:**

In case of long term planning the prospective cost of the construction project is required for the planning of the budget.

Estimating and Costing determines the prospective costs of the construction project in accordance to the plans and specifications for various items of works. Quality of material, type of labour, equipments, tools, transport cost affects the rates of an item of the work. The rates of completed item of the work vary from place to place. However, learner will be able to determine the quantities and cost with reasonable accuracy and in accordance with the standards as per IS: 1200.

The topic on approximate estimate is useful for calculating approximate cost of the building / roads etc. which is further useful for the making budget provisions in the planned works.

The information on detailed estimate based on measurements and the rate of completed item of work is useful in finding comparatively accurate costs of each item of work and total cost of the buildings / roads / structures etc. which is useful for preparation of tender documents and thereafter for the execution of the work.

The rate analysis of an item of work shall help in finding out the rate per unit on the basis of material cost, labour cost, contractors profit and other probable miscellaneous expenditure required for the completed item of the work for actual execution of the works as per lead and lift.

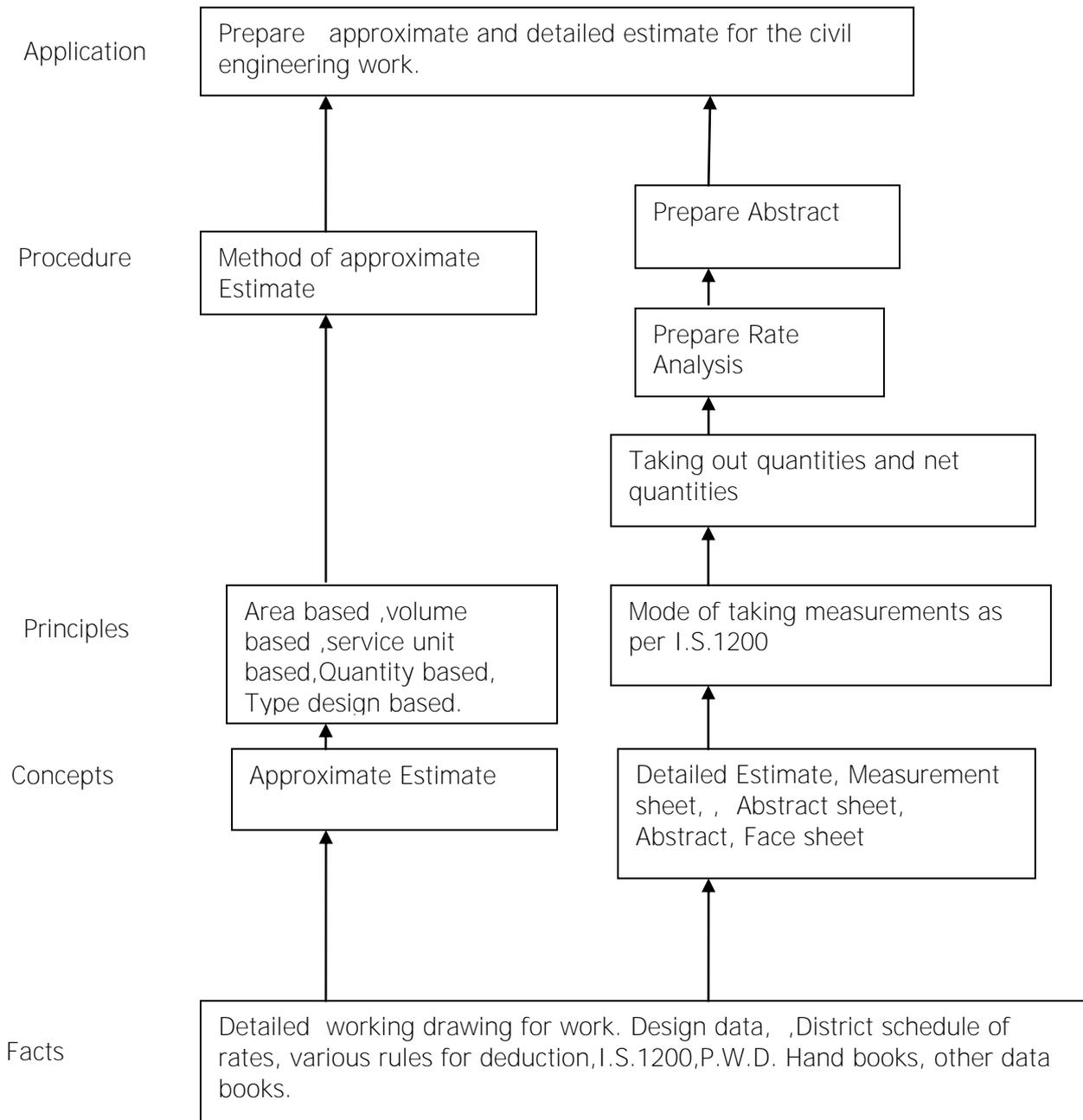
Thus the subject shall strongly help to build professionalism among the learner by providing the knowledge and estimating skills at the project sites along with the use of software's / programmes of estimating which makes learner a perfect professional civil engineer.

### **General Objectives:**

Student will be able to:

- Understand units and modes of measurements of various items of work.
- Know the method of preparation of approximate estimates of various civil engineering works.
- Apply knowledge of preparation of check list of items of construction, rate analysis for preparation of detailed estimate of various civil engineering works.
- Understand the preparation of bill of quantities by taking measurements of completed item of work and rate of the item
- Apply computer software's to prepare estimate of building works

**Learning Structure:**



## Theory

| Topic and Contents   | Hours | Marks |
|--|-------|-------|
| <p><b>Topic 1. Introduction</b></p> <p>Specific objectives:</p> <ul style="list-style-type: none"> <li>➤ Define and state purpose of estimating and costing.</li> <li>➤ List different methods of approximate estimate.</li> <li>➤ Collect local rates of materials, labour and equipments along with local terms used.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Estimates- Meaning of the term estimating and costing, purpose of estimating and costing. Types of estimates and their purpose</li> <li>• Approximate estimate- Plinth area rate method, Cubical content method, Service unit method, Typical bay method, Approximate quantity method.</li> <li>• Problems on plinth area rate method and use of service unit method for selection of service units for different types of buildings.</li> <li>• Detailed estimate- Detailed estimate, revised estimate, supplementary estimate, revised and supplementary estimate, repair and maintenance estimate and their uses in practical situation.</li> </ul> | 04    | 08    |
| <p><b>Topic 2. Mode of measurement and brief specifications</b></p> <p>Specific objectives:</p> <ul style="list-style-type: none"> <li>➤ State units and modes of measurement and payments for various items of works.</li> <li>➤ Apply rules of deductions for openings as per IS 1200.</li> <li>➤ Use standard formats of measurement sheet, abstract sheet and face sheet.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Units of measurement and desired accuracy as per IS: 1200, Rules of deduction for openings as per IS:1200 for brick work, plastering and pointing.</li> <li>• Sequence of execution and brief description /specification of items of work as per PWD/GOVT. DSR, Standard formats of measurement sheet, Abstract sheet, face sheet.</li> </ul>  | 06    | 12    |

| Topic and Contents  | Hours | Marks |
|---|-------|-------|
| <p style="text-align: center;"><b>Topic 3. Preparation of estimate</b></p> <p>Specific objectives:</p> <ul style="list-style-type: none"> <li>➤ Collect the data regarding cost/Sq.m for various types of buildings as per PWD and local rates.</li> <li>➤ Prepare approximate estimates of various civil engineering works.</li> <li>➤ Understand various items of works of different civil engineering structures.</li> <li>➤ Prepare check list for civil engineering works.</li> <li>➤ Apply methods of taking out quantities.</li> <li>➤ Adopt procedure of preparing detailed estimate of RCC framed structures and Load bearing structures.</li> <li>➤ Prepare bar bending schedule of RCC works.</li> <li>➤ Apply various methods for earth work computation.</li> <li>➤ Incorporate various provisions to be made in detailed estimate.</li> </ul> <p><b>Contents:</b></p> <p><b>3.1 Approximate estimate ..... (16M)</b></p> <ul style="list-style-type: none"> <li>• Plinth area/carpet area/Super built up area of building by using PWD rates and local rates</li> <li>• Estimates of roads, highway, railways, bridges/culverts, irrigation projects and water supply projects.</li> </ul> <p><b>3.2 Detailed estimate ..... (12 M)</b></p> <ul style="list-style-type: none"> <li>• Data required for detailed estimate</li> <li>• Steps in preparation of detailed estimate</li> <li>• Preparing check list of RCC framed structure building/roads, listing of approximate % of steel required for various RCC members.</li> <li>• Methods for taking out quantities by Long wall and Short wall method, Centre line method.</li> <li>• Taking out quantities of various items of building (RCC framed structure and Load bearing structure), road work as per PWD method.</li> </ul> | 22    | 40    |

| Topic and Contents   | Hours | Marks |
|--|-------|-------|
| <p><b>3.3</b> ..... <b>(12 M)</b></p> <ul style="list-style-type: none"> <li>• Bar bending schedule and steel quantities calculation for footing, column, beam, slab and chajja.</li> <li>• Earthwork computation-Meaning and methods, calculation of earthwork quantity for roads and canal by average cross sectional area method, mid sectional method, Prismoidal formula method.</li> <li>• Provisions to be made in detailed estimate for contingencies, work charged establishment, centage charges, water supply and sanitary arrangements, internal electrification etc.</li> <li>• Meaning of the terms- Prime cost, Provisional sum, provisional quantities, Day work.</li> </ul>   |       |       |
| <p><b>Topic 4. Rate Analysis</b></p> <p>Specific objectives:</p> <ul style="list-style-type: none"> <li>➤ Understand definition, purpose and concept of rate analysis.</li> <li>➤ Collect local rates of materials, labours and hiring charges of tools and plants with transportation charges.</li> <li>➤ Understand the concept of lead and lift.</li> <li>➤ Prepare rate analysis of various items of work.</li> </ul> <p><b>Contents:</b></p> <p><b>4.1</b> ..... <b>( 8M)</b></p> <ul style="list-style-type: none"> <li>• Definition, purpose, importance of rate analysis, factors affecting rate analysis, procedure of rate analysis.</li> <li>• Meaning of term lead, lift, task work, material rate and labour charges, conveyance capacity of different types of vehicle, transportation of materials and charges, categories of labours, their rates, overhead charges, contractors profit, work charge establishment and water charges.</li> </ul> | 10    | 24    |

| Topic and Contents   | Hours | Marks |
|--|-------|-------|
| 4.2 ..... ( 16M)<br>• Preparing rate analysis of different items of work- excavation, PCC, RCC Footing, brick masonry, stone masonry, RCC work (column, beam, lintel, slab etc.), flooring, plastering, DPC, Wood work for doors and windows frames and shutters.  |       |       |
| <p><b>Topic 5. Estimate for Civil Engineering works</b></p> <p>Specific objectives:</p> <ul style="list-style-type: none"> <li>➤ Prepare estimate for different civil engineering works</li> <li>➤ Prepare sample estimate by using computer software/Excel programme.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Preparation of detailed estimate for: 6 to10 users septic tank, and Community well.</li> <li>• Preparation of detailed estimate for a small RCC slab culvert.</li> <li>• Use of computer/ software/programmes for detailed estimate preparation of building works.</li> </ul> | 06    | 16    |
| <b>Total</b>   | 48    | 100   |

**Practicals:**

**Skills to be developed**

**Intellectual Skills:**

1. List various items of work with the units in a civil engineering structures.
2. Calculate quantities of various items of works

**Motor Skills:**

1. Prepare rate analysis.
2. Prepare detailed estimate of civil engineering structures.

### List of Assignments:

1. Prepare the checklist of the following Civil Engineering works.
  - i) RCC framed structure building.
  - ii) Bituminous pavement road with WBM as sub-base.
2. Collection of local rate of construction material, labours, tools and equipments.
3. Preparation of approximate estimate of the various types of buildings by PWD method / guide lines.

**(Teacher shall provide required drawing/data)**

  - i) School Building.
  - ii) Hospital Building.
  - iii) Residential Building.
  - iv) Auditorium Building.
4. Taking out the quantities of various items of the work for the load bearing structure by **any one method** ( Center line / Long wall and short wall )

**(Teacher shall provide required drawing/data)**

  - i) Excavation for foundation.
  - ii) Plain cement concrete for foundation.
  - iii) UCR masonry in foundation and plinth.
  - iv) Damp proof course.
  - v) Plinth filling.
  - vi) Burnt Brick masonry in superstructure.
  - vii) Flooring, skirting and dados.
  - viii) Plastering. ( Internal , External and ceiling)
  - ix) Woodwork in door frame and shutter.
  - x) Painting ( inside / outside and ceiling)
5. Taking out quantities of following items for a small RCC Hall.

**(Teacher shall provide required drawing/data)**

  - i) Concrete work for footing , column, beam, slab, lintel and RCC chajja
  - ii) Schedule of reinforcement for structural members and computation of quantities of reinforcement.
  - iii) Calculation of formwork for all above items (5( i ) )
6. Preparing rate analysis of **any four** of the following items of building works.
  - i) Excavation for the road.
  - ii) PCC for foundation trenches.
  - iii) UCR Masonry in foundation and plinth.
  - iv) Brickwork in super structure.
  - v) Plastering.
  - vi) Flooring.
  - vii) Teakwood frame for door / window.
  - viii) RCC beams / slab.
  - ix) RCC columns / footings.
  - x) Coloring / Painting.

7. Prepare detailed estimate of ground floor of a RCC ,(G+1) Residential Building Framed Structure (2 BHKD with attached toilet to 1 bedroom with European type WC ) with dog legged staircase.[The drawing prepared in 4<sup>th</sup> semester in CAD may be used] Calculate also the per square meter cost of the building (**This exercise is carried out by making batch of 5 to 6 students).** (Teacher shall provide required drawing/data if necessary)
8. Calculate quantity by field measurements for the following.
  - i) Flooring.
  - ii) Plastering ( Internal or External )
  - iii) Brickwork.
  - iv) RCC stairs.

**(Teacher shall arrange field visit batch wise)**
9. Taking out quantities of the earthwork for a road profile of 500 meter length by mid-section or mean area method. (Drawing of profile leveling prepared in 3rd semester may be used.)
10. Taking out quantities of the earthwork for a road profile of 500 meter length by using Excel / any other available software / program.

### Learning Resources:

#### 1. Books:

| Sr. No. | Title  | Author                                     | Publisher   |
|---------|--|--|---|
| 01      | Estimating and Costing in Civil Engineering                              | B.N. Dutta                                 | UBS Publishers Distributors Pvt. Ltd., New Delhi  |
| 02      | Estimating and Costing, Specification and Valuation in Civil Engineering | M. Chakraborti                             | M. Chakraborti, Kolkata                           |
| 03      | Estimating and Costing   | S.C. Rangwala                              | Charotar Publication, Anand                       |
| 04      | Estimating and Costing   | G.S. Birdie                                | Dhanpat Rai and Sons.                             |
| 05      | Civil engineering Estimating vol. 1                                      | B.S.Patil                                  | Orient longman,mumbai                             |
| 06      | Estimating construction costs (fifth edition)                            | Robert L. Peurifoy<br>Garold D. Oberlender | Tata McGraw Hill Education Private Ltd, New Delhi |

#### 2. CDs, PPTs Etc.:

| Sr. No. | Title             |
|---------|-------------------|
| 01      | MSBTE CAI Package |
| 02      | Q.E. PRO software |

#### 3. IS, BIS and International Codes:

| Sr. | Title |
|-----|-------|
|-----|-------|

|     |  |
|-----|--|
| No. |  |
| 01  | IS-1200- Method of measurement of building and civil engineering works |
| 02  | District Schedule of rate of PWD                                       |

#### **4. Websites:**

- a) www.maharashtra.gov.in
- b) www.mahapwd.com
- c) [www.cpwd.com](http://www.cpwd.com)
- d) www.newtonindia.com
- e) www.ensoftindia.com