***BANGLADESH TECHNICAL EDUCATION BOARD***

Agargoan, Dhaka-1207.

*4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM*

SYLLABUS (PROBIDHAN-2016)

# SURVEYING TECHNOLOGY

TECHNOLOGY CODE: **678**

4th SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

# SURVEYING TECHNOLOGY (678)

## 4th SEMESTER

| Sl. No | Subject code | Name of the subject | T | P | C | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | Practical | | Total |
| | | | | | | Cont. assess | Final exam. | Cont. asses s | Final exam. | |
| 1 | 67841 | Traversing & Cadastral Surveying | 2 | 6 | 4 | 40 | 60 | 50 | 50 | 200 |
| 2 | 67842 | Survey CAD | 1 | 3 | 2 | 20 | 30 | 25 | 25 | 100 |
| 3 | 67843 | Field Astronomy | 1 | 3 | 2 | 20 | 30 | 25 | 25 | 100 |
| 4 | 67844 | Advance Surveying-1 | 2 | 3 | 3 | 40 | 60 | 25 | 25 | 150 |
| 5 | 66442 | Estimating & Costing -1 | 2 | 3 | 3 | 40 | 60 | 25 | 25 | 150 |
| 6 | 66441 | Structural Mechanics | 2 | 3 | 3 | 40 | 60 | 25 | 25 | 150 |
| 7 | 65841 | Business Organization & Communication | 2 | 0 | 2 | 40 | 60 | - | - | 100 |
| | | **Total** | **12** | **21** | **19** | **240** | **360** | **175** | **175** | **950** |

## 67841 Traversing & Cadastral Surveying

| T | P | C |
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| 2 | 6 | 4 |

### AIMS

- To be able to use of prismatic Compass.
- To be able to use of plane table.
- To provide the students with an opportunity to acquire knowledge and skills to: conduct cadastral survey work.
- record surveyed data and plot the map.
- locate lost boundary.
- Conduct tertiary leveling work.

### SHORT DESCRIPTION

Introduction to cadastral surveying; Preparation of records of rights; Extraction of areas; Preparation comparative map; Tertiary leveling Compass, prismatic compass, plane table.

### DETAIL DESCRIPTION

**Theory :**

**1. Understand the basic concept of cadastral survey.**

1.1 Explain the meaning of cadastral survey.
1.2 Mention the purpose of cadastral survey.
1.3 Describe the scope of cadastral survey.
1.4 Explain the terms base line, cheek line and station point.
1.5 Explain the scales used in cadastral survey.

**2. Understand the features of the instrument used in cadastral survey.**

2.1 List the instrument and accessories used in cadastral survey.
2.2 Identify Günter's Chain, ranging rod, offset rod, tape and arrows.
2.3 Explain the principle & uses of plane table.
2.4 State the principle & construction of optical square.
2.5 Mention the uses of the optical square.
2.6 Mention the procedure of checking and adjustment of optical square.

**3. Understand the concept of the revisional settlement and S. A. operation.**

3.1 State the meaning of revisional settlement.
3.2 State the meaning of S. A. operation.
3.3 Mention the purpose of revisional settlement and S.A. operation.
3.4 Explain the meaning of records of right.
3.5 State the meaning of the terms; khanapuri, bujharat, attestation,

khatian, draft publication objection and appeal and final publication.

**4. Understand the main traverse, sub traverse & mouza traverse.**

4.1 Define mouza traverse, and sub traverse.
4.2 Mention the classification of traverse.
4.3 List the field works involved in mouza and sub traversing.
4.4 Explain the mouza and sub traversing by methods of included angle and direct Co-ordinate.
4.5 Explain the checking of Mouza and sub traverse.

**5. Understand the concept of plotting main, sub & mouza travese including computation of area.**

5.1 Mention the procedure of plotting Mauza and sub Traverse
5.2 Calculate the bearing from included angles of mouza and sub-traverse.
5.3 Compute co-ordinates of Mouza and sub traverse.
5.4 Describe Bowditehe's rule and transit rule.
5.5 State the balancing of the closed mouza and sub traverse.
5.6 Compute the area of closed Mouza and sub traverse by co-ordinate, latitude and double meridian, departure and total tatitude methods.

**6. Understand the concept of traverse in solving problems**

6.1 Indetify different types of problems in mouza and sub traversing.
6.2 Calculate the length and bearing of a missing side and any included angles of mouza and sub traverse
6.3 List the sources of errors in theodolite Mouza and sub traverse,survey.
6.4 List Mistakes in theodolite Mouza and sub Traverse survey.
6.5 Explain the closing errors in theodolite Mouza and sub Traversing.

**7. Understand the methods of preparing mouza map.**

7.1 Define mouza map.
7.2 Describe the use of scale in mouza map preparation.
7.3 Identify the symbols used in mouza map.
7.4 State the meaning of sikmi line, cheek line, main station, sub-station and chanda.
7.5 List the meaning of khaka.
7.6 Mention the rule of numbering the plots.
7.7 Explain the method of writing heading, sub-headings and numbering on mouza map.

**8. Understand the aspects of kistower.**

8.1 Explain kistower.
8.2 Identify the instrument used in kistower.
8.3 List the manpower required in kistowar.
8.4 Mention the stage in kistowar. Manual and digital method
8.5 Explain field work in kistowar (e.g. finding station, making quadrilateral, distribution of error, making kistowar, making field book of cheek line).
8.6 Describe office work in kistowar (e.g. inking and writing heading, writing symbols).
8.7 Describe office work by digital data impute and data processing.

**9. Understand the different methods of computing area of plot.**

9.1 Mention the procedure for carrying out the field work for computing of areas within regular and irregular perimeter.
9.2 Compute area along boundary using different rules.
9.3 Identify the instrument and method used in computing area.
9.4 Mention the procedure of computing area from a map with the help of scale & divider.
9.5 Calculate an area with the help of scale & divider.
9.6 Mention the procedure of computing area from a given map with the help of acore-comb.
9.7 Calculate an area from a map with the help of digital map measurer.

**10. Understand the features of comparative map.**

10.1 State the meaning of cadastral map and demarcation of Mouza boundary.
10.2 State the purpose of demarcation of boundary.
10.3 State the meaning of comparative map.
10.4 Explain comparative scale.
10.5 Outline the necessity of comparative map.
10.6 Describe the procedure of making comparative map.

**11.Understand the method of demarcation of boundary.**

11.1 state the necessity of demarcation of boundary property.
11.2 List the causes of dispute of demarcation.
11.3 Explain the method of preparing mouza map.
11.4 State the meaning of relaying of old map.
11.5 Mention the purpose of relaying a map.
11.6 State the procedure of plotting offset on map of the boundary.
11.7 Describe the methods of fixing pegs on the boundary in the field.

**12. Understand the Principles of traverse survey.**

12.1 List the field works in prismatic compass traversing.
12.2 List the field works in plane table traversing
12.3 List the field works in digital theodolite traversing.
12.4 Describe the traversing by methods of included angles and direct angle.
12.5 Describe the Operation procedure and data collection by total station Traversing.
12.6 Describe the Operation procedure and data collection by GPS Traversing.
12.7 Describe the procedure of finding Co-ordinate (lat. & long.) of a station using GPS.
12.8 Explain measuring a traverse line with EDM.

**13. Understand the concept of plotting traverse including computation of area.**

13.1 Calculate bearing from traverse angle.
13.2 Compute coordinates of traverse stations.
13.3 Explain Gale's traverse table.
13.4 Describe Bowditch's rule and transit rules.
13.5 Describe the procedure of balancing the closed traverse.
13.6 Describe the procedure of plotting traverse.
13.7 Compute the area of closed traverse by co-ordinates, meridian departures and total latitude method.

**14. Understand the Procedure of plane table traverse.**

14.1 Explain plane table traverse
14.2 Explain the sequence of work in plane table traverse.
14.3 Select suitable scale for traverse.
14.4 Describe of procedure of plane table traverse .
14.5 Identify the sources or errors in plane table survey.
14.6 List the common mistakes in plane table survey.
14.7 Explain the way to avoid errors and mistakes in plane table survey in a traverse.

**Practical :**

1 Conduct traverses with Plane table and plot the traverse including computation of areas.
2 Perform adjustment of closing error in closed traverse.
3 Conduct traversing with digital theodolite & ETS .
4 Identify different instruments and accessories used in cadastral survey.
5 Prepare a traverse of a mouza boundary with total station/thoudulite.
6 Prepare a sub traverse of a mouza.
7 Conduct the cadastral survey small area with plan table/total station.
8 Cheek the cadastral survey map.
9 Measure the area of a plot from mouza map.
10 Produce plot number.

REFERENCE BOOKS

1 Surveying - Dr. BC. Punmia
2 Surveying (Volume one & two) – Dr. K. R. Arora.
3 Advance Surveying – Md . Motahar Hossain .
4 Surveying -Norman Thomas
5 Plane and Geodetic Surveying - D Clark
6 Surveying – Aziz and Shahjahan

## 67842 Survey CAD

| T | P | C |
|---|---|---|
| 1 | 3 | 2 |

**AIMS**

- To understand the common terms used in surveying & mapping
- To understand the various CAD mapping programs
- To prepare & apply the use of survey field notes
- To utilizes plan profiles & alignment sheets for construction design
- To generate land development project using survey field notes
- To prepare a topographic map

**SHORT DESCRIPTION**

Plotting of surveyor's field notes. Includes drawing elevations, contour lines, plan and profiles, laying out traverses, interpreting survey data and topographic symbols, and producing topographical drawings.

**AUTO CAD 2D:**

**DETAILS DESCRIPTION**

**1: Getting started in autoCAD environment**

1.1 About Autodesk & AutoCAD
1.2 CAD History
1.3 Graphical User Interface
1.4 Application Menu
1.5 Workspaces
1.6 Accessing Help
1.7 Drawing Templates
1.8 Standards Based Design
1.9 Create New Drawings and Templates

**2: Object Property & Layer Management & setting up a drawing**

**2.1** Using scale
2.2 Use units, limit, zoom, pan command.
2.3 Managing Layers
2.4 Configure Object Property Settings
2.5 Automatic Management of Layers
2.6 Layer Functions and Display

**3: Drawing Geometry & drawing basics**

3.1 Drawing Creation Workflows and Organization
3.2 Structuring Data in Drawings
3.3 Reusing and Editing Structured Data

**4: Tools for Creating Key Geometry**

4.1 Organizing drawing

4,2 Core Design Tools: Creating Rectangles, Placing Hatch, Fillets, Chamfers, Contours

4.3 Power Snaps

4.4 Center lines

4.5 Construction Lines

4.5 Designing with Lines

**5: Tools for Manipulating Geometry**

5.1 Editing & Modify Tools

5.2 Power Commands

5.3 Design & Construction

5.4 Plan profile

**6: Creating Drawing Sheets**

6.1 Model Space Views in Layouts.

6.2 Creating Drawing Sheets in Model Space

6.3 Annotation

6.4 Title Blocks and Drawing Borders

**7: Dimensioning and Annotating Drawings**

7.1 Annotation and Annotation Symbols

7.2 Creating Dimensions

7.3 Different text style

7.4 Editing Dimensions

7.5 Working with hatches

**8: Setting Up a Layout**

8.1 Printing Concepts

8.2 Working in Layouts

8.3 Creating Layouts

8.4 Guidelines for Layouts

**9: File Management**

9.1 Import & Export

9.2 DWG Files

9.3 IGES Files

9.4 Project Documentation

**10: Creating Civil drawing**

10.1 Creating a site plan.

10.2 Creating a Typical floor plan

10.3 Creating a layout plan of a building.

10.4 Creating a Foundation & roof plan of a building

**11: Plotting & Printing**

11.1 Printing Layouts

11.2 Print & Plot Settings

11.3 Projects Printing / Plotting

**AutoCAD 3D**

**12: The AutoCAD Civil 3D Interface**

12.1 AutoCAD Civil 3D GUI
12.2AutoCAD Civil 3D Toolspace
12.3 AutoCAD Civil 3D Panorama
12.4 Workshops

**13: Survey**

13.1 Survey Workflow Overview
13.2 Survey Figures
13.3 Points
13.4 Importing Survey Data
13.5 Point Groups

**14: Surfaces**

14.1 Surface Processes
14.2 Surface Properties
14.3 Contour Data
14.4 Other Surface Data
14.5 Break lines and Boundaries
14.6 Surface Labels
14.7 Surface Volume Calculations
14.8 Surface Analysis Display

**PRACTICAL:**

1 Create a layout page.
2.Draw a polygon from given data.
3.Draw a building plan & elevation.
4.Draw a building section.
5. Create a topographic map.
6. Create a contour map .
7.Create a Profile view from Surface
8.Print a topographic map with scale.

## Reference Books:

**2. Civil Engg. Drawing - Guru Charan Singh**
**3. AutoCAD - Engr. Md. Shah Alam**
**4. Mastering AutoCAD - Engr. Samuel Mallik**
**5. Mastering AutoCAD - George Omura**

## 67843 Field Astronomy T P C 1 3 2

### AIMS

- To enable to understand spherical triangle
- To enable to understand Astronomical Triangle
- To enable to understand system of co-ordinates for determining position of places on earth surface and of heavenly bodies.
- To enable to understand transformation of co-ordinates
- To enable to understand time and its conversion

### *SHORT DESCRIPTION*

Spherical trigonometry, Spherical triangle, Celestial co-ordinate System, Transformation of celestial co-ordinates, time, Astronomical refraction, Parallax, Annual parallax, Aberration and Precession & notation.

### DETAILS DESCRIPTION

**1.Understand spherical trigonometry**

1.1 Define sphere, great circle, small circle and poles.
1.2 Fine the length of great circle, small circle and distance between two points on the surface of a sphere.
1.3 Explain celestial sphere, celestial poles, celestial horizon, celestial equator, polar equator, polar axis, zenith and nadir.
1.4 Explain spherical trigonometry.
1.5 Define spherical triangle
1.6 Explain the properties of a spherical triangle.
1.7 Establish the sine formula, cosine formula, tangent and co-tangent formulae for spherical triangle.
1.8 Express the deduction of “Napier’s rule of circular part” in a right angled spherical triangle.
1.9 Explain spherical excess.
1.10 Solve problems related to sine formula, cosine formula, tangent & cotangent formulae, Napier role and spherical excess.

**2.Understand system of co-ordinates for locating the position of places on earth surface**

2.1 Explain the procedure of determining the position of a place on earth surface.
2.2 Explain latitude and longitude.
2.3 Explain parallel of latitude.
2.4 Explain nautical mile.
2.5 Solve problems in respect of determining position of places on earth surface.

**3.Understand system of co-ordinates for locating position of heavenly bodies.**

3.1 Define astronomical terms like ecliptic, obliquity of ecliptic, equinoctial Point, vernal equinox, autumnal equinox, summer solstice, winter solstice, sensible horizon, visible horizon, terrestrial equator, vertical circle, prime vertical, co-latitude, azimuth declination, co-declination, hour angle and right ascension.

3.2 Show that the altitude of the celestial pole is equal to the latitude of the place of observation.
3.3 Mention the systems of co-ordinates for locating position of a heavenly body.
3.4 Explain the altitude and azimuth system.
3.5 Explain the declination and hour angle system
3.6 Explain the declination and right ascension system
3.7 Explain the latitude and longitude system
3.8 Explain circum polar star and star at culmination
3.9 Solve problems for finding altitude, azimuth, hour angle, altitude, longitude etc.

**4.Understand transformation of celestial co-ordinates**

4.1 Establish relation of azimuth with altitude, declination and latitude
4.2 Establish the relation of hour angle with altitude, declination and latitude
4.3 Establish relation of azimuth with zenith distance, polar distance and co-altitude of the observer.
4.4 Establish the relation of hour angle with zenith distance, polar distance and co-altitude of the observer.
4.5 Establish the relation between hour angle, latitude and declination with the heavenly body at elongation.
4.6 Establish the relation between altitude, declination and latitude with the heavenly body at zenith.
4.7 Establish the relation between hour angle, declination and latitude with the heavenly body at zenith.
4.8 Establish the relation between altitude latitude, longitude, hour angle and declination.
4.9 Solve problems for finding azimuth, hour angle, altitude, latitude, longitude etc.

**5.Understand time**

5.1 Explain the term sidereal day, sidereal time, apparent solar time, mean solar time, local time, local time, local mean time, green witch mean time
5.2 Find the relation among the terms sidereal time, hour angle and right ascension
5.3 Find out the relation between declination, latitude of observer and zenith distance
5.4 Explain the equation of time
5.5 Convert standard time to local time and vice versa

**6.Understand astronomical refraction**

6.1 Define optical refraction, relative refraction, astronomical refraction
6.2 Explain the law of atmospheric refraction
6.3 Discuss the effect of atmospheric refraction
6.4 Discuss the effect of refraction on times of rising and setting of a heavenly body
6.5 Discuss the effect of refraction on the size moon or sun of the horizon
6.6 Discuss the effect of refraction on right ascension and declination of a heavenly body
6.7 Discuss the method for finding the co-efficient of atmospheric refraction
6.8 Discuss the cosine's method of atmospheric refraction
6.9 Solve problems related to astronomical refraction

**7.Understand parallax**

7.1 Define parallax, geocentric parallax, horizontal parallax & annual parallax.
7.2 State the law of parallax

7.3 Compare the effect of geocentric parallax and atmospheric refraction
7.4 Find the horizontal parallax of the moon
7.5 Find the horizontal parallax of the sun
7.6 Find the radius of the sun and moon using parallax method
7.7 Discuss the effect of parallax on declination and hour angle of a heavenly body.
7.8 Define annual parallax of a star.
7.9 Find the relation between annual parallax and distance of a star
7.10 Discuss the effect of a annual parallax on a star.

**8.Understand aberration**

8.1 Define aberration and planetary aberration
8.2 State the rule of aberration
8.3 Discuss the effect of aberration.
8.4 Discuss the aberration on latitude and longitude of a star
8.5 Discuss the aberration on declination and right ascension
8.6 Find the formula for aberration correction
8.7 Solve problem related to aberration correction

**9.Understand precession and notation**

8.6 Define precession and notation
8.7 Discuss the causes of precession
8.8 Discuss the causes of notation
8.9 Discuss the effect of precession on declination and right ascension of a star
8.10 Discuss the effect of notation

## PRACTICAL

**1** Determine latitude of a place.
**2** Determine longitude of a place.
**3** Determine the global position of your institution.
**4** Determine the local time of your place by any method.
**5** Determine the distance between tow stars.
**6** Identify North Pole.
**7** Draw a north-south line on a field.
**8** Identify equator of your institution .

## REFERENCE BOOKS


**1.** Surveying-5 -Md Mokhlesur Rahman
**2.** Surveying - Dr. Bc. Punmia
**3.** Surveying (Volume two) - Dr. K. R. Arora.
**4.** Advance Surveying - Md. Motahar Hossain.

## 67844 Advance Surveying-1

| T | P | C |
|---|---|---|
| 2 | 3 | 3 |

**AIMS**

* To be able to conduct digital theodolite, EDM, Total Station & GPS.
* To be enable to prepare horizontal & vertical angle with digital theodolite
* To the able to Understand different types of curve and curve ranging.

**SHORT DESCRIPTION:**

Temporary and permanent adjustment of digital theodolite & Total Station. Principal of digital theodolite, EDM, Total Station & GPS. Curve setting, curve ranging.

**DETAILS DESCRIPTION:**

**Theory:**

**1. Understand the theodolite & digital theodolite & their adjustment .**

1.1 Define theodolite &digital theodolite.
1.2 Describ the components of theodolite &digital theodolite and its function.
1.3 Describ the working principle of theodolite & Digital theodolite.
1.4 Explain the meaning of adjustment of theodolite &digital theodolite
1.5 Classify different types of adjustment.
1.6 Explain the different steps of temporary adjustment.
1.7 Explain the different steps of permanent adjustment.

**2. Understand the principles of measuring angles and bearing with theodolite & digital theodolite.**

2.1 Describe the procedure of setting theodolite
2.2 Describe the procedure of taking horizontal angle with theodolite
2.3 Describe the procedure of taking vertical angle with theodolite
2.4 Explain the procedure of measuring magnetic bearing of a line.
2.5 Explain the procedure of measuring true bearing of a line.

**3.Understand the operation and use of electronic distance meter (EDM).**

3.1 Mention the advantages of EDM.
3.2 Mention the operational steps of setting of EDM.
3.3 Mention the procedures in conducting traverse survey with EDM.
3.4 Describe the procedure of plotting map.

**4.Understand the operation and use of total station.**

4.1 Identify the components of total station and their functions.

4.2 Mention the uses of total station.

4.3 Mention relationship among the fundamental lines of total station.

4.4 Mention the operational steps of setting of total station.

4.5 Mention the procedures in conducting traverse survey with total station.

4.6 Describe the procedure of measuring horizontal distance, vertical height, and area with total station.

4.7 Describe the procedure of plotting map with total station.

**5.Understand the principles of operation and uses of GPS.**

5.1 Explaining the meaning of GPS.

5.2 Mention the uses of GPS.

5.3 Mention the operational steps of setting of GPS.

5.4 Describe the procedure of finding co-ordinates (latitude and longitude) of a station using GPS.

5.5 Describe the procedure of preparation of a map using mapping software and data received with GPS.

**Curve & curve ranging.**

**6.Understand the concept of curve.**

6.1 Define a curve.

6.2 Explain the necessity of a curve.

6.3 Classify curve.

6.4 Describe circular curve.

6.5 Explain different types of circular curve.

6.6 Explain the nomenclature of simple curves.

6.7 List the elements of simple curves.

6.8 Deduce the formula for finding radius of a circular curve.

6.9 Deduce formula for calculating the different elements of a simple curve.

6.10 Solve problems related to curve.

**7. Understand the concept of curve ranging.**

7.1 Explain curve ranging.

7.2 Name the instruments required for curve ranging.

7.3 Classify the methods of curve ranging.

7.4 Explain the steps in curve ranging.

7.5 Describe the procedure of finding out deflection angle.

7.6 Explain procedure of finding out deflection angle without using angular instrument.

7.7 Explain the procedure of finding out the location of tangent point.

**8.Understand the concept of setting out curve by linear method.**

8.1 Mention the classification of linear method of setting out curve.
8.2 Deduce the formula for setting out curve by ordinates from long chord.
8.3 Explain the procedure of setting out curve by ordinates from long chord.
8.4 Deduce formula for setting out curve by offsets from tangent methods (radially and perpendicularly).
8.5 Explain the procedure of setting out curve by successive bisection of arcs.
8.6 Deduce the formula for setting out curve by offset from chords produced methods.
8.7 Explain the procedure of setting out curve by taking offset from chords produced.
8.8 Solve problems on setting out of circular curves.

**9. Understand the concept of setting out curve by angular method.**

9.1 Describe the angular method of curve ranging.
9.2 Deduce the formula for setting out curve by one theodolite.
9.3 Solve problems related to setting out curve by one theodolite.
9.4 Explain the procedure of setting out curve by two theodolite.
9.5 Solve problems related to angular method of curve ranging.

**10. Understand the concept to transiting curve.**

10.1 Define transiting curve.
10.2 Explain the necessity of transiting curve.
10.3 Mention different types of transiting curve.
10.4 List the elements of transiting curve.
10.5 Explain the various elements of transiting curve.
10.6 Express the deduction of the formula for calculation the length of the transiting curve .
10.7 Explain shift and spiral angle.
10.8 Explain the procedure of setting out a transition curve by angle method.
10.9 Explain the procedure of setting out transition curve by offset method.
10.10 Solve problem transition curve.

**11. Understand the concept of vertical curve.**

11.1 Describe vertical curve.
11.2 Classify vertical curve on the basis of their purposes.
11.3 Explain the properties of parabola.
11.4 Describe the purposes of calculating data for setting out vertical curve.
11.5 Explain the procedure of finding out the grade of an undulated proposed road.
11.6 Explain the procedure of setting out vertical curve.

**Practical:**

**Digital theodolite.**

1. Conduct temporary adjustment of theodolite
2. Conduct permanent adjustment of theodolite.
3. Conduct permanent adjustment of Total Station.
4. Set out circular curve by offset from long chord method.
5. Set out circular curve by offset from tangent method (perpendicular offset method)
6. Set out circular curve by offset from chord prolonged.
7. Set out circular curve by offset from one theodolite /two theodolite method.
8. Set out transition curve by offset method.
9. Set out vertical curve.

**Reference Books:**


1. Surveying and Leveling -----T.P.kanetker (vol-1& 2)
2.A text book of Surveying-----P.B.Shahani (vol-1& 2)
3.Plane and Geodetic Surveying------D.Clark
4.Surveying & Leveling----------B.C.Punmia

# 66442 ESTIMATING & COSTING -I

| T | P | C |
|---|---|---|
| 2 | 3 | 3 |

## AIMS:

- To provide the ability of quantity analysis of civil engineering works.
- To enable to estimate volume quantities of materials used in construction works.
- To provide understanding cost abstract of civil engineering works.
- To be able to improve knowledge and skill of estimating two storied building consisting of spread footing.
- To develop skill in estimating RCC and bituminous road.
- To develop skill in rate analysis process for different items of work in the building trades.

## SHORT DESCRIPTION:

Introduction to estimating, Quantity estimation of excavating tank, road embankment, canal digging, steps, boundary wall, bituminous & RCC road, estimate of a single storied two- roomed building with verandah and double storied building, rate analysis.

## DETAIL DESCRIPTION:

### Theory:

**1. Understand the basic concept of estimating.**

1.1 Define the term estimating.
1.2 State the methods of estimating.
1.3 Mention the rules and methods of measurements of works.
1.4 Mention the rules of deduction for opening, bearing portion etc. in masonry works.
1.5 List unit weight of different materials used in construction works
1.6 Write the unit of different items of construction works as per standard practice.

**2. Estimate the volume of earth work for excavating a tank**

2.1 Mention the rules of finding out the volume of earth work by mid area method, mean area method & prismoidal method.
2.2 Mention the comparison with computing volume by three methods.
2.3 Calculate the volume of earth work in excavation of a tank by mid area method.
2.4 Calculate the volume of earth work in excavation of a tank by mean area method.
2.5 Calculate the volume of earth work in excavation of a tank by prismoidal method.

**3. Estimate the volume of earth work for road embankment.**

3.1 Identify the side slopes for different heights of road embankment.
3.2 Identify the cross section of road embankment.
3.3 State the method of finding out the volume of earth work in embankment by mid area method, mean area method & prismoidal method.
3.4 State the finding out the volume of earthwork partly cutting & partly filling of road.
3.5 Calculate the volume of earth work in embankment by mean area method.
3.6 Calculate the volume of earth work in embankment by mid area method.
3.7 Calculate the volume of earth work in embankment by prismoidal method.
3.8 Calculate the volume of earth work for a road partly banking and partly cutting.

**4. Estimate the volume of earth work for canal digging.**

4.1 Identify the cross section of partly banking and partly cutting.

4.2 Explain the method of finding out volume of earth work for partly cutting and partly banking.
4.3 Explain the terms lead and lift

**5. Estimate the different quantities of item of works in steps, boundary wall and roads.**

5.1 Identify different parts of a steps and calculate the quantities of works.
5.2 List different items of works in a boundary wall.
5.3 List different items of works in a bituminous road.
5.4 List different items of works in a RCC road.
5.5 Prepare an estimate for construction of 100m long boundary wall.
5.6 Prepare an estimate for construction of 100m long bituminous road.
5.7 Prepare an estimate for construction of 100m long RCC road.

**6. Understand the procedure of estimate of a single storied two room building with a verendah.**

6.1 State centre line and separate wall method.
6.2 Mention the advantage and disadvantage of centre line and separate wall methods.
6.3 Explain the methods of deduction for opening or over lapping.
6.4 Define the terms sub-structure and super- structure.
6.5 Calculate the earth work in excavation of foundation trenches.
6.6 Calculate the brick work (1:6) in foundation up to plinth level.
6.7 Calculate the wood work in door and window frames.
6.8 Calculate the wood work in door and window shutters.

**7. Understand the basic concept of rate analysis.**

7.1 State meaning of rate analysis. .
7.2 Explain the purposes of rate analysis.
7.3 Explain the terms: contractors profit, overhead charges, contingency sundries and lumsum (LS)
7.4 Explain the unit rate of materials & labour.
7.5 Mention the advantage of rate analysis to prepare cost estimate.
7.6 Calculate the analysis of rates for different items of building works.
   a) Brick flat soling & herring bone bond (10 sqm).
   b) 125 mm thick & 250 mm thick brick work (10cum).
   c) Cement concrete (1:3:6) work for 10cum.
   d) R.C.C. works (1:2:4) for 10cum.
   e) Plastering work with cement mortar (1:6 ) for10 sqm.

## PRACTICAL

1. Determine the rate of different categories of labour considering the work site including lead and lift.
2. Calculate the quantity of cement, sand and brick required for 10 cum masonry work using (1:6) mortar.
3. Calculate the quantity of cement, sand and brick required for 10 sqm brick masonry work (125mm thick wall) with 1:4 mortar.
4. Calculate the quantity of cement, sand and brick khoa required for 10 cum reinforced cement concrete (1:2:4) work.
5. Prepare an estimate for construction of underground water reservoir.
6. Prepare an estimate for making wooden chair/ table/almirah.
7. Calculate the quantity of following items of work of a double storied building with verandah.
   7.1 One layer brick flat soling in foundation and floor.
   7.2 Cement concrete work (1:3:6) in foundation and floor.
   7.3 Earth work in filling the sides of foundation trenches and plinth.
   7.4 Brick work (1:6) in super structure.

7.5 125 mm thick Brick work (1:4) in partition wall.
7.6 RCC work (1:2:4) in lintel, beams, roof slab, stair, sunshade and drop wall.
7.7 Mild steel bar reinforcement fabrication in different RCC works when percentage given.
7.8 Grill work for windows.
7.9 Cement plaster to both sides of brick wall.
7.10 Cement plaster to all RCC surface.
7.11 Cement plaster to plinth wall and skirting with neat cement finishing (NCF).
7.12 Patent stone flooring (PSF)
7.13 Lime terracing over RCC roof slab.
7.14 White washing/distempering.
7.15 Color washing/ snowcem washing/weather coat.

## REFERENCE BOOKS:


1. Estimating and costing - B N Datta
2. Estimating and costing - Gurucharan Singh

## 66441 Structural Mechanics

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**AIMS:**

- To enable to apply the knowledge of scientific principles to problems of mechanical nature.
- To develop an understanding of mechanical properties of materials.
- To assist in applying mathematical and geometrical calculations to the analysis of statically determinate beams.

**SHORT DESCRIPTION**

Mechanical properties of material; Laws of forces; Moment; Friction; Centroid and centre of gravity; Moment of inertia; Torsion on circular shaft; Shear force and bending moment.

**DETAIL DESCRIPTION**

**Theory:**

**1.0 Understand the important aspects of mechanical properties of materials.**

1.1 Mention the necessity to know about the mechanical properties of materials.

1.2 Define the following terms:

a. Stress, tensile stress, compressive stress, shear stress.

b. Strain, tensile strain, compressive strain, shear strain,

c. Hooke's law, modulus of elasticity and modulus of rigidity.

1.3 Explain stress-strain diagram of mild steel and concrete.

1.4 Define the following terms:

a. Elasticity, proportional limit, yield point, ultimate stress, breaking stress, working stress and factor of safety.

b. Strength, stiffness, toughness, ductility, malleability, brittleness, creep, fatigue failure, resilience, modulus of resilience, thermal stress in simple bar and poisons ratio.

1.5 Compute stress, strain, modulus of elasticity and modulus of rigidity.

1.6 Solve problems involving resilience, thermal stress and poisons ratio.

1.7 Compute stress develop in composite bar under tension and compression.

**2. Understand the concept of laws of forces.**

2.1 Explain the laws of forces.

2.2 Define the following terms: Force, co-planar forces, non-coplanar forces, concurrent forces, non-concurrent forces, co-linear forces, parallel forces, laws of equilibrium of forces.

2.3 Mention the parallelogram laws of forces.

2.4 State the composition of forces and resolution of force.

2.5 Define component of force, rectangular component and resultant of forces.

2.6 Compute the resultant force-

a. Triangle of forces

b. Polygon of forces

c. Converse laws of triangle and polygon laws of forces graphically.

2.7 Calculate the resultant of forces: co-planar forces, concurrent forces, parallel forces and co-linear forces
2.8 Explain Lami's theorem.
2.9 Solve problems on Lami's theorem.

**3. Understand the aspects of moment of forces.**

3.1 Define the term moment (analytically and graphically).
3.2 Differentiate moment with force.
3.3 Explain Varigon's principle of moment.
3.4 Distinguish like and unlike parallel forces.
3.5 State the meaning of couple.
3.6 Mention the properties of couple.
3.7 Solve problems on moment of couple and moment of forces.
3.8 Solve problems on moment of like and unlike parallel forces.

**4. Understand the concept of frictional forces.**

4.1 State friction, static friction and dynamic friction.
4.2 Mention the laws of static friction and dynamic friction.
4.3 Explain angle of friction and co-efficient of friction.
4.4 Compute friction of a body on horizontal planes.
4.5 Compute friction of a body on inclined planes.
4.6 Compute frictional force acting on a ladder.

**5. Understand the aspects of centroid and centre of gravity.**

5.1 Define the terms: centroid and centre of gravity.
5.2 State the axis of symmetry and parallel axis.
5.3 Compute the centroid by the method of moment of the following sections:
a. rectangular b. triangular c. circular d. semi-circular
e. hollow f. I –shaped g. T –shaped h. L -shaped

5.4 Solve problem on centre of gravity of a composite parallelepiped body.

**6. Understand the concept of moment of inertia.**

6.1 State 1st and 2nd moment of area.
6.2 Explain the meaning of radius of gyration.
6.3 Mention the theorems of moment of inertia.
6.4 Compute the moment of inertia of plane area about any axis of the following sections:
a. rectangular b. triangular c. circulard. semi-circular
e. hollow f. I –shaped g. T –shaped h. L -shaped

**7. Understand the aspects of torsion on solid and hollow circular shaft.**

7.1 State the laws of motions.
7.2 Explain the term circular motion.
7.3 Define the terms: torsion and torsional stress.
7.4 Mention the fundamental assumptions of torsional stress.
7.5 Find the relation between torsional stress and strain.
7.6 Interpret the formulas relating to finding torque
7.7 Solve problems involving torsion.

**8. Understand shear force (SF) and bending moment (BM).**

8.1 Define the term `beam'.
8.2 List different types of beams.
8.3 Mention various types of load on beams.
8.4 Define shear force and bending moment.
8.5 Differentiate between shear force and bending moment.
8.6 Mention the sign conventions of shear force and bending moment.
8.7 List the characteristics of shear force and bending moment diagram.
8.8 Calculate and draw SF and BM diagram of cantilever beams with point load, distributed load and both.
8.9 Calculate and draw SF and BM diagram of simply supported beams with point load, distributed load and both.
8.10 Calculate and draw SF and BM diagram of simply supported overhanging beam with point load, distributed load and both.

**PRACTICAL:**

1. Perform compression test of a timber specimen.
2. Conduct tensile test of mild steel rod and draw stress-strain curve with test results.
3. Determine the percentage elongation of mild steel.
4. Determine the centroid of a composite area.
5. Determine the resultant of a force system graphically.
6. Show the resultant of forces by using force board.
7. Prove the Lami's theorem by using force board.
8. Practice to determine the co-efficient of friction of timber, concrete and mild steel.
9. Practice to determine reactions of a beam by using spring balance.

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1. Structural Mechanics - W Morgan and D T Williams
2. Structural Mechanics - Singer / Popov
3. Mechanics of Materials - Philip Gustave Laurson and Williams Junkin Cox
4. Structural Mechanics - A. K. Upadhyay Published by SK Kateria & Sons, India.
5. Applied Mechanics - R.S Khurmi

## 65841 Business Organization & Communication

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### AIMS:

- To be able to understand the basic concepts and principles of business organization.
- To be able to understand the banking system.
- To be able to understand the trade system of Bangladesh.
- To be able to understand the basic concepts of communication and its types, methods.
- To be able to perform in writing, application for job, complain letter & tender notice.

### SHORT DESCRIPTION:

Principles and objects of business organization; Formation of business organization; Banking system and its operation; Negotiable instrument; Home trade and foreign trade. Basic concepts of communication Communication model & feedback; Types of communication; Methods of communication; Formal & informal communication; Essentials of communication; Report writing; Office management; Communication through correspondence; Official and semi- official letters.

### *DETAIL DESCRIPTION:*

### Theory:

**1. Concept of Business organization.**

1.1 Define business.
1.2 Mention the objects of business.
1.3 Define business organization.
1.4 State the function of business organization.

**2. Formation of Business organization.**

2.1 Define sole proprietorship, partnership, Joint Stock Company. and co-operative
2.2 Describe the formation of sole proprietorship, partnership, joint stock Company, & co operative.
2.3 Mention the advantages and disadvantages of proprietorship, partnership and Joint Stock Company.
2.4 State the principles of Co operative & various types of Co operative.
2.5 Discuss the role of co-operative society in Bangladesh.

**3. Basic idea of Banking system and negotiable instrument.**

3.1 Define bank.
3.2 State the service rendered by bank.
3.3 Describe the classification of bank in Bangladesh.
3.4 State the functions of Bangladesh Bank in controlling money market.
3.5 State the functions of commercial Bank in Bangladesh
3.6 Mention different types of account operated in a bank.
3.7 Mention how different types of bank accounts are opened and operated.

3.8 Define negotiable instrument.
3.9 Discuss various types of negotiable instrument.
3.10 Describe different types of cheque.

**4. Home & foreign trade**

4.1 Define home trade.
4.2 Describe types of home trade.
4.3 Define foreign trade.
4.4 Mention the advantages and disadvantages of foreign trade.
4.5 Discuss the import procedure & exporting procedure.
4.6 Define letter of credit.
4.7 Discuss the importance of foreign trade in the economy of Bangladesh.

**5. Basic concepts of communication**

5.1 Define communication & business communication.
5.2 State the objectives of business communication.
5.3 Describe the scope of business communication.
5.4 Discuss the essential elements of communication process.

**6. Communication model and feedback.**

6.1 Define communication model.
6.2 State the business functions of communication model.
6.3 Define feedback.
6.4 State the basic principles of effective feedback.

**7. Types and Methods of communication.**

7.1 Explain the different types of communication;-
   a) Two-way communication
   b) Formal & informal communication
   c) Oral & written communication
   d) Horizontal & vertical communication
   e) external & internal communication
   f) Spoken & listening communication.
7.2 Define communication method.
7.3 Discuss the various methods of communication.
7.4 Distinguish between oral and written communication.

**8. Essentials of communication.**

8.1 Discuss the essential feature of good communication.
8.2 Describe the barriers of communication.
8.3 Discuss the means for overcoming barriers to good communication.

**9. Report writing.**

9.1 Define report, business report & technical report.
9.2 State the essential qualities of a good report.
9.3 Describe the factors to be considered while drafting a report.
9.4 Explain the components of a technical report.
9.5 Prepare & present a technical report.

**10. Office management.**

10.1 Define office and office work.
10.2 State the characteristics of office work.
10.3 Define filing and indexing.
10.4 Discuss the methods of filing.
10.5 Discuss the methods of indexing.
10.6 Distinguish between filing and indexing.

**11. Official and semi-official letters.**

11.1 State the types of correspondence.
11.2 State the different parts of a commercial letter.
11.3 Define official letter and semi-official letter.
11.4 Prepare & present the following letters: Interview letter, appointment letter, joining letter and application for recruitment. Complain letters, tender notice.

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7. Business organization & management- M.C. Shukla

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