

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 4th Semester (Civil Engineering)(wef 2019-20)

Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
Theory									
Th.1		Geotechnical Engineering	4		-	20	80	3	100
Th.2		Estimation & Cost Evaluation- I	4		-	20	80	3	100
Th.3		Surveying – I*	5		-	20	80	3	100
		<i>Total</i>	<i>13</i>			<i>60</i>	<i>240</i>	<i>-</i>	<i>300</i>
Practical									
Pr.1		Survey Practice-I	-	-	7	50	100		
Pr.2		Estimation Practice-I (Computer-Aided)	-	-	3	25			
Pr.3		Technical Seminar			3	25			
Pr.4		Student Centered Activities(SCA)		-	3				
		<i>Total</i>	<i>-</i>	<i>-</i>	<i>16</i>	<i>100</i>	<i>100</i>	<i>-</i>	<i>200</i>
		Grand Total	13	-	16	160	340	-	500

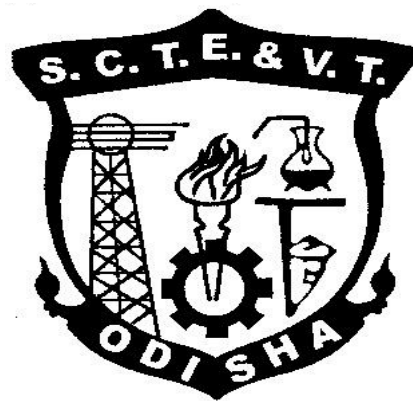
Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM etc. ,Seminar and SCA shall be conducted in a section.

There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester

CURRICULLUM OF 4THSEMESTER
For
DIPLOMA IN CIVIL ENGINEERING(PT)
(Effective FROM 2019-20Sessions)



**STATE COUNCIL FOR TECHNICAL
EDUCATION & VOCATIONAL TRAINING,
ODISHA, BHUBANESWAR**

Th1. GEOTECHNICAL ENGINEERING

Name of the Course: Diploma in Civil Engineering(PT)			
Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4P/week	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

A. Rationale

The course aims to prepare the students to comprehend the design principles associated with the civil foundations and other geotechnical structures. The students will develop competency in estimating and predicting soil strength and slope based on properties and design requirements.

B. Course Objectives

On completion of the course, students will be able to -

1. comprehend the scope of soil mechanics and define the associated terminology and inter-relation among various soil properties.
2. classify and indentify soil types under different standards
3. comprehend significance of permeability and seepage and compute those.
4. describe requirement and methodology of compaction and consolidation.
5. realize the methods towards shear strength estimation and obtain strength envelop for different types of soils.
6. define terms of foundation engineering and estimate bearing capacity.

C. Topic Wise Distribution

Chapter	Name of topics	Periods
1	Introduction	02
2	Preliminary Definitions and Relationship.	06
3	Index Properties of soil	04
4	Classification of Soil	06
5	Permeability and Seepage	07
6	Compaction and Consolidation.	08
7	Shear Strength.	06
8	Earth Pressure on Retaining Structures.	07
9	Foundation Engineering.	14

D. Course Contents:

1 Introduction

- 1.1 Soil and Soil Engineering
- 1.2 Scope of Soil Mechanics
- 1.3 Origin and formation of soil

2 Preliminary Definitions and Relationship

- 2.1 Soil as a three Phase system.
- 2.2 Water Content, Density, Specific gravity, Voids ratio, Porosity, Percentage of air voids, air content, degree of saturation, density Index, Bulk/Saturated/dry/submerged density, Interrelationship of various soil parameters

3 Index Properties of Soil

- 3.1 Water Content
- 3.2 Specific Gravity
- 3.3 Particle size distribution: Sieve analysis, wet mechanical analysis, particle size distribution curve and its uses
- 3.4 Consistency of Soils, Atterberg's Limits, Plasticity Index, Consistency Index, Liquidity Index

4 Classification of Soil

- 4.1 General
- 4.2 I.S. Classification, Plasticity chart

5 Permeability and Seepage

- 5.1 Concept of Permeability, Darcy's Law, Co-efficient of Permeability,
- 5.2 Factors affecting Permeability.
- 5.3 Constant head permeability and falling head permeability Test.
- 5.4 Seepage pressure, effective stress, phenomenon of quick sand

6 Compaction and Consolidation

6.1 Compaction: Compaction, Light and heavy compaction Test, Optimum Moisture

Content of Soil, Maximum dry density, Zero air void line, Factors affecting Compaction, Field compaction methods and their suitability

6.2 Consolidation: Consolidation, distinction between compaction and consolidation.

Terzaghi's model analogy of compression/ springs showing the process of consolidation – field implications

7 Shear Strength

7.1 Concept of shear strength, Mohr- Coulomb failure theory, Cohesion, Angle of internal friction, strength envelope for different type of soil, Measurement of shear strength;- Direct shear test, triaxial shear test, unconfined compression test and vane-shear test

8 Earth Pressure on Retaining Structures

8.1 Active earth pressure, Passive earth pressure, Earth pressure at rest.

8.2 Use of Rankine's formula for the following cases (cohesion-less soil only)

(i) Backfill with no surcharge, (ii) backfill with uniform surcharge

9 Foundation Engineering

9.1 Functions of foundations, shallow and deep foundation, different type of shallow and deep foundations with sketches. Types of failure (General shear, Local shear & punching shear)

9.2 Bearing capacity of soil, bearing capacity of soils using Terzaghi's formulae & IS Code formulae for strip, Circular and square footings, Effect water table on bearing capacity of soil

9.3 Plate load test and standard penetration test

E. COURSE COVERAGE UPTO INTERNAL EXAMINATION

Chapters 1, 2, 3, 4, 5, 6

F. RECOMMENDED BOOKS

Learning Resources			
Text Books			
Sl. No	Name of Authors	Titles of Book	Name of Publisher
1	Dr. B.C.Punmia	Soil Mechanics & Foundation Engineering	Laxmi publications (P) LTD
2	Dr. K.R.Arora	Soil Mechanics& Foundation Engineering	Standard Publishers Distributors Ltd.
3	Dr. V.N.S. Murthy	Soil Mechanics& Foundation Engineering, Vol-I	UBS Publishers Distributors Ltd.

Th2. ESTIMATION & COST EVALUATION – I

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	4 th
Total Period:	60	Examination	3 hrs
Theory periods:	4P/week	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE

The course enables the students to be ready to act as estimator and prepare necessary plans before construction satisfying the requirements imposed by different regulatory bodies. Further, the course helps them realize the organizational hierarchy and professional roles.

B. COURSE OBJECTIVES

On completion of the course, students will be able to –

1. Understand the significance of accurate estimation practices.
2. Evaluate and generate component wise estimates for a building
3. Develop a proper cost estimate for single storeyed building.
4. Analyse and offer reason behind the costs involved in different components
5. Prepare abstract of cost estimates in line with prescription by state regulating bodies.
6. Realize the levels existing in organization and comprehend the roles and responsibilities at different levels.

C. TOPIC WISE DISTRIBUTION

Chapter	Name of topics	Periods
1	Introduction :	02
2	Quantity Estimate of Building	32
3	Analysis of Rates and Valuation.	22
4	Administrative Set-Up of Engineering Organisations	04

D. COURSE CONTENTS:

1 Introduction

- 1.1 Types of estimates – Plinth area, floor area / carpet area
- 1.2 Units and modes of measurements as per IS 1200
- 1.3 Accuracy of measurement for different item of work

2 Quantity Estimate of Building

- 2.1 Short wall long wall method and centre line method, deductions in masonry, plastering, white washing, painting etc., multiplying factor (paint coefficients) for painting of doors and windows (paneled/glazed), grills etc.
- 2.2 Detailed estimate of single storied flat roof building with shallow foundation and RCC roof slab with leak proof treatment over it including staircase and mummy room.

3 Analysis of Rates and Valuation

- 3.1 Analysis of rates for cement concrete, brick masonry in Cement Mortar, laterite stone masonry in Cement Mortar, cement plaster, white washing, Artificial Stone flooring, Tile flooring, concrete flooring, R.C.C. with centering and shuttering, reinforcing steel, Painting of doors and windows etc. as per OPWD.
- 3.2 Calculation of lead, lift, conveyance charges, royalty of materials, etc. as per Orissa P.W.D. system (Concept of C.P.W.D./Railways provisions)
- 3.3 Abstract of cost of estimate.
- 3.4 Valuation- Value and cost, scrap value, salvage value, assessed value, sinking fund, depreciation and obsolesce, methods of valuation.

4 Administrative Set-Up of Engineering Organisations:

- 4.1 Administrative set-up and hierarchy of Engineering department in State Govt./Central Govt./PSUs/Private Sectors etc. Duties and responsibilities of Engineers at different positions /levels.

E. Course Coverage up to Internal Assessment:

Chapters 1, 2

F. Recommended Books

Sl. No	Name of Authors	Titles of Book	Name of Publisher
1	M.Chakraborty.	Estimating, Costing, specification &Valuation in Civil Engineering	Published by author
3	B.N.Dutta	Estimating &Costing	UBSPD
4	A. Panigrahi	Accounts & contracts	Vikas Publication
5	Govt. of Odisha	Latest Orissa PWD Schedule of Rates & Analysis of rates	Govt. of Odisha

NB: The use of schedule and analysis of rates of Govt. of Odisha is allowed in the end examination.

Th3. SURVEY – I

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	4 th
Total Period:	75	Examination	3 hrs
Theory periods:	5P/week	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE

Survey is an essential prerequisite for all types of civil construction activities. This course aims to provide knowledge in area of plane survey and the survey instruments. Besides, the course aims to provide students in map reading and area computations from survey data.

B. COURSE OBJECTIVES

On completion of the course students will be able to

1. Define various survey terminology and carryout necessary corrections for errors
2. Comprehend the principle, purpose, equipment and error corrections in chain and compass surveying
3. Comprehend the principle, purpose, equipment and error corrections in plane table and theodolite surveying
4. Comprehend the map nomenclature and apply skills in map interpretation
5. Gather skill towards leveling and contouring with knowledge of purpose and different methods thereof
6. Compute area and volume using different numerical algebraic methods

C. Topic Wise Distribution of Periods

Chapter	Name of topics	Periods
1	Introduction To Surveying, Linear Measurements	07
2	Chaining and Chain Surveying	07
3	Angular Measurement and Compas Surveying	12
4	Map Reading Cadastral Maps & Nomenclature	07
5	Plane Table Surveying	07
6	Theodolite Surveying and Traversing:	15
7	Levelling and Contouring	15
8	Computation of Area & Volume	05

D. Course Contents

- 1 **INTRODUCTION TO SURVEYING, LINEAR MEASUREMENTS:**
 - 1.1 Surveying: Definition, Aims and objectives
 - 1.2 Principles of survey-Plane surveying- Geodetic Surveying- Instrumental surveying.
 - 1.3 Precision and accuracy of measurements, instruments used for

measurement of distance, Types of tapes and chains.

1.4 Errors and mistakes in linear measurement – classification, Sources of errors and remedies.

1.5 Corrections to measured lengths due to-incorrect length, temperature variation, pull, sag, numerical problem applying corrections.

2 CHAINING AND CHAIN SURVEYING :

2.1 Equipment and accessories for chaining

2.2 Ranging – Purpose, signaling, direct and indirect ranging, Line ranger – features and use, error due to incorrect ranging.

2.3 Methods of chaining –Chaining on flat ground, Chaining on sloping ground – stepping method, Clinometer-features and use, slope correction.

2.4 Setting perpendicular with chain & tape, Chaining across different types of obstacles –Numerical problems on chaining across obstacles.

2.5 Purpose of chain surveying, Its Principles, concept of field book.

Selection of survey stations, base line, tie lines, Check lines.

2.7 Offsets – Necessity, Perpendicular and Oblique offsets, Instruments for setting offset – Cross Staff, Optical Square.

2.8 Errors in chain surveying – compensating and accumulative errors causes & remedies, Precautions to be taken during chain surveying.

3 ANGULAR MEASUREMENT AND COMPAS SURVEYING :

3.1 Measurement of angles with chain, tape & compass

3.2 Compass – Types, features, parts, merits & demerits, testing & adjustment of compass

3.3 Designation of angles- concept of meridians – Magnetic, True, arbitrary; Concept of bearings – Whole circle bearing, Quadrantal bearing, Reduced bearing, suitability of application, numerical problems on conversion of bearings

3.4 Use of compasses – setting in field-centering, leveling, taking readings, concepts of Fore bearing, Back Bearing, Numerical problems on computation of interior & exterior angles from bearings.

3.5 Effects of earth's magnetism – dip of needle, magnetic declination, variation in declination, numerical problems on application of correction for declination.

3.6 Errors in angle measurement with compass – sources & remedies.

3.7 Principles of traversing – open & closed traverse, Methods of traversing.

3.8 Local attraction – causes, detection, errors, corrections, Numerical problems of application of correction due to local attraction.

3.9 Errors in compass surveying – sources & remedies.

Plotting of traverse – check of closing error in closed & open traverse, Bowditch's correction, Gales table

4 MAP READING CADASTRAL MAPS & NOMENCLATURE:

4.1 Study of direction, Scale, Grid Reference and Grid Square
Study of Signs and Symbols

4.2 Cadastral Map Preparation Methodology

4.3 Unique identification number of parcel

4.4 Positions of existing Control Points and its types

4.5 Adjacent Boundaries and Features, Topology Creation and verification.

5 PLANE TABLE SURVEYING :

5.1 Objectives, principles and use of plane table surveying.

5.2 Instruments & accessories used in plane table surveying.

5.3 Methods of plane table surveying – (1) Radiation, (2) Intersection, (3) Traversing, (4) Resection.

5.4 Statements of TWO POINT and THREE POINT PROBLEM.

Errors in plane table surveying and their corrections, precautions in plane table surveying.

6 THEODOLITE SURVEYING AND TRAVERSING:

6.1 Purpose and definition of theodolite surveying

6.2 Transit theodolite- Description of features, component parts, Fundamental axes of a theodolite, concept of vernier, reading a vernier, Temporary adjustment of theodolite

6.3 Concept of transiting –Measurement of horizontal and vertical angles.

6.4 Measurement of magnetic bearings, deflection angle, direct angle, setting out angles, prolonging a straight line with theodolite, Errors in Theodolite observations.

6.5 Methods of theodolite traversing with – inclined angle method, deflection angle method, bearing method, Plotting the traverse by coordinate method, Checks for open and closed traverse.

6.6 Traverse computation – consecutive coordinates, latitude and departure, Gale's traverse table, Numerical problems on omitted measurement of lengths & bearings

6.7 Closing error – adjustment of angular errors, adjustment of bearings, numerical problems

6.8 Balancing of traverse – Bowditch's method, transit method, graphical method, axis method, calculation of area of closed traverse.

7 LEVELLING AND CONTOURING :

7.1 Definition and Purpose and types of leveling– concepts of level surface, Horizontal surface, vertical surface, datum, R. L., B.M.

7.2 Instruments used for leveling, concepts of line of collimation, axis of bubble tube, axis of telescope, Vertical axis.

7.3 Levelling staff – Temporary adjustments of level, taking reading with level, concept of bench mark, BS, IS, FS, CP, HI.

7.4 Field data entry – level Book – height of collimation method and Rise & Fall method, comparison, Numerical problems on reduction of levels applying both methods, Arithmetic checks.

7.5 Effects of curvature and refraction, numerical problems on application of correction.

- 7.6 Reciprocal leveling – principles, methods, numerical problems, precise leveling.
- 7.7 Errors in leveling and precautions, Permanent and temporary adjustments of different types of levels.
- 7.8 Definitions, concepts and characteristics of contours.
- 7.9 Methods of contouring, plotting contour maps, Interpretation of contour maps, toposheets.
- 7.10 Use of contour maps on civil engineering projects – drawing cross-sections from contour maps, locating proposal routes of roads / railway / canal on a contour map, computation of volume of earthwork from contour map for simple structure.
- 7.11 Map Interpretation: Interpret Human and Economic Activities (i.e.: Settlement, Communication, Land use etc.), Interpret Physical landform (i.e.: Relief, Drainage Pattern etc.), Problem Solving and Decision Making

8 COMPUTATION OF AREA & VOLUME:

- 8.1 Determination of areas, computation of areas from plans.
- 8.2 Calculation of area by using ordinate rule, trapezoidal rule, Simpson’s rule.
- 8.3 Calculation of volumes by prismoidal formula and trapezoidal formula, Prismoidal corrections, curvature correction for volumes.

E. SYLLABUS COVERAGE UPTO INTERNAL ASSESSMENT

Chapters 1, 2, 3, 4

F. RECOMMENDED BOOKS

Sl. No	Name of Authors	Titles of Book	Name of Publisher
1	R.Subramanian	Surveying and Levelling	Oxford
2	Dr.B.C.Punmia.	Surveying, Vol.-I&II	Laxmi Publication
3	R. Agor	A text Book of Surveying & Levelling	Khanna Publishers
4	N.N Basak.	Surveying & Levelling	TMH Publishing

Pr1.SURVEY PRACTICE-I

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	4 th
Total Period:	105	Examination	3hrs
Lab. periods:	7P/week	Term Work	50
Maximum marks:	150	End Semester Examination:	100

A. RATIONALE

The course prepares the students in use of survey instruments to conduct survey, present and interpret the generated data. This course, further, aims to enable students in map reading and computation of area from survey generated data. In addition, It introduces modern practice of survey that is photogrammetry which is applied in topographic mapping and site planning activities, along with the foundation for GIS information generation.

B. COURSE OBJECTIVES

On completion of the course students will be able to

1. Undertake linear measurement activities using chains in absence or presence of obstacles
2. Conduct compass surveying and record data in necessary format
3. Read, interpret and verify a map
4. Setup plane table and conduct survey using different methods
5. Use of theodolite and plot the traverse and contour maps
6. Realize significance of photogrammetry as pictorial, accurate and permanent record and understand the basics of aerial photography
7. Acquire image through aerial and satellite platform and scanning thereof along with stereoscopic measurement
8. Generate DTM/DEM and ortho-image

C. TOPIC WISE DISTRIBUTION OF PERIODS

Chapter	Name of topics	Periods
1	Linear Measurements, Chaining and Chain Surveying	05
2	Angular Measurement and Compass Surveying	12
3	Map Reading Cadastral Maps & Nomenclature	08
4	Plane Table Surveying	13
5	Theodolite Traversing	10
6	Levelling and Contouring	12
7	Basics of Aerial Photography	09
8	Basics of Photogrammetry, DEM and Ortho Image Generation	36

D. COURSE CONTENTS:

1.0 Linear Measurements, Chaining and Chain Surveying:

- 1.1 Testing and adjusting of a metric chain.
- 1.2 Measurement of distance between two points (more than 2 chain lengths apart) with chain including direct ranging.
- 1.3 Setting out different types of triangles, given the lengths of sides with chain and tape.
- 1.4 Measurement of distance between two points by chaining across a sloped ground using stepping method and a clinometer.
- 1.5 Measurement of distance by chaining across a obstacles on the chain line i) a pond ii) a building iii) a stream/ river (in the event of non-availability of stream / river, a pond or lake may be taken, considering that chaining around the same is not possible).
- 1.6 Setting perpendicular offsets to various objects (at least 3) from a chain line using-(1) tape, (2) cross-staff, (3) optical square and comparing the accuracy of the 3 methods
- 1.7 Setting oblique offsets to objects (at least 3) from a chain using tape

2.0 Angular Measurement and Compass Surveying:

- 2.1 Testing and adjustment of Prismatic compass and Surveyor's compass.
- 2.2 Measurement of bearings of lines (at least 3 lines) and determination of included angles using Prismatic compass and Surveyor's compass.
- 2.3 Setting out triangles (at least 2) with compass, given the length and bearing of one side and included angles.
- 2.4 Setting out a closed traverse of 5 sides, using prismatic compass, given bearing of one line and included angles and lengths of sides.
- 2.5 Conducting chain and compass traverse surveying in a given plot of area (2plots) and recording data in the field book. (5 to 6 students/groups)

3.0 Map Reading Cadastral Maps & Nomenclature:

- 3.1 Study of direction, Scale, Grid Reference and Grid Square
- 3.2 Study of Signs and Symbols
- 3.3 Cadastral Map Preparation Methodology
- 3.4 Unique identification number of parcel
- 3.5 Positions of existing Control Points and its types
- 3.6 Adjacent Boundaries and Features, Topology Creation and verification.

4.0 Plane Table Surveying:

- 4.1 Setting up of Plane Table and Plotting five points by radiation method and five inaccessible points by intersection method.
- 4.2 Conducting Plane Table surveying in a given plot of area by traversing (Atleast a 5-sided traverse and locating the objects)
- 4.3 Plane table surveying by Resection method (two point & three point problem method)

5.0 Theodolite Traversing:

- 5.1 Measurement of horizontal angles (3nos.) by repetition and reiteration method and compare two methods
- 5.2 Prolonging a given straight line with the help of a theodolite

- 5.3 Determination of magnetic bearing of 3 given straight lines
Setting out a closed traverse with 6 sides and entering the field data
- 5.4 Plotting the traverse from exercise 4.1 and checking the error of closure
- 5.5 Setting out an open traverse with 5 sides and entering the field data
- 5.6 Plotting the traverse from exercise 4.3 and checking the error of closure

6.0 Leveling and Contouring:

- 6.1 Making temporary adjustments of Levels
- 6.2 Determining Reduced Levels of five given points taking staff readings with Levels.
- 6.3 Determining the difference of levels between two points (3 pairs of points / group) by taking staff readings from single set up of level, recording the readings in level book and application of Arithmetic check. (At least 3 change points must be covered)
- 6.4 Conduct Fly Leveling (Compound) between two distant points with respect to R.L. of a given B.M. and reduction of levels by both height of collimation and rise & fall method and applying Arithmetic check. (At least 3 change points must be covered)
- 6.5 Conduct profile leveling along the given alignment for a road / canal for 150m length, taking L. S. at every 15m and C. S. at 1m & 3m apart on both sides at every 30m interval and recording the data in level book and applying arithmetical check.
- 6.6 Locating contour points in the given area by direct method / indirect method
- 6.7 Conducting block level survey in the given area
- 6.8 Plotting and drawing contour map of a given area by radial method
- 6.9 Map Interpretation: Interpret Human and Economic Activities (i.e.: Settlement, Communication, Land use etc.), Interpret Physical landform (i.e.: Relief, Drainage Pattern etc.), Problem Solving and Decision Making

7.0 Basics of Aerial Photography:

- 7.1 Film
- 7.2. Focal Length
- 7.3. Scale
- 7.4. Types of Aerial Photographs (Oblique, Straight)

8.0 Basics of Photogrammetry, DEM and Ortho Image generation:

Photogrammetry:

- 8.1 Classification of Photogrammetry
- 8.2 Aerial Photogrammetry
- 8.3 Terrestrial Photogrammetry

Photogrammetry Process:

- 8.4 Acquisition of Imagery using aerial and satellite platform
- 8.5 Control Survey
- 8.6 Geometric Distortion in Imagery
- 8.7 Application of Imagery and its support data
- 8.8 Orientation and Triangulation
- 8.9 Stereoscopic Measurement: X-parallax and Y-parallax
- 8.10 DTM/DEM Generation
- 8.11 Ortho Image Generation

E. RECOMMENDED BOOKS:

- | | |
|---------------------------------------|------------------------|
| ○ Surveying and Leveling | - R.Subramanian |
| ○ Surveying, Vol.-I&II | -Dr.B.C.Punmia |
| ○ A text Book of Surveying & Leveling | -R.Agor. |
| ○ Surveying Part-III | - Dr.B.C.Punmia |
| ○ Advanced Surveying | - D. Gaikwad, S. Chand |

Pr.2 ESTIMATING PRACTICE

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	4th
Total Period:	45	Examination	
Lab. periods:	3 P/week	Term Work	25
Maximum marks:	25	End Semester Examination:	00

A. RATIONALE

The course will enable the students to develop detailed estimate and prepare bill of materials essential for buildings in accordance with prescribed codes.

B. COURSE OBJECTIVES

After completion of the course, students will be able to

CO1- Prepare estimates for 2 room single storey building

CO2- Prepare estimate for 2 storeyed buildings

CO3- Comprehend the schedule and analysis of rates offered by State Works Department

CO4- Use MS Excel to prepare analysis of rates

CO5- Evaluate dry material list and cost associated using MS Excel

CO6- Prepare abstract of costs and bill of materials for single storey and double storey buildings

C. TOPIC WISE DISTRIBUTION

Chapter	Name of topics	Periods
1	Estimate for plinth area	21
2	Analysis of rates	09
3	Dry material calculation	09
4	Cost estimate and bill of quantities	06

D. COURSE CONTENTS

- 1.0 Preparation of plinth area estimate & detailed estimate for the following ;
 - 1.1 Single storeyed two roomed building with specification as per Orissa P.W.D. schedule of rates and analysis of rates
 - 1.2 A two storeyed pucca Building with specification as per Orissa P.W.D. schedule of rates and analysis of rates

- 2.0 Analysis of rates in detail for the above items of works basing on Orissa Govt. analysis of rate with help of **MS Excel software**.
- 3.0 Calculation of dry materials for different items of building basing on Orissa Govt. analysis of rate with help of **MS Excel software**
- 4.0 Preparation of abstract of cost and bill of quantities of the estimates as per item no. 1.0 above with help of **MS Excel software**

E. RECOMMENDED BOOKS

1. Estimating, Costing, specification & Valuation in Civil Engineering
M.Chakraborty. -
2. Estimating & Costing -B.N.Dutta.
3. Estimating & Costing -Birdi & Ahuja.
4. Latest Orissa PWD Schedule of Rates & Analysis of rates.