

## STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

**TEACHING AND EVALUATION SCHEME FOR 3rd 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
<b>Theory</b>									
Th.1		Structural Mechanics	5		-	20	80	3	100
Th.2		Geotechnical Engineering	4		-	20	80	3	100
Th.3		Building materials & Construction Technology	5		-	20	80	3	100
Th.4		Estimation & Cost Evaluation- I	4			20	80	3	100
Th.5		Environmental studies	4			20	80	3	100
		<i>Total</i>	22			100	400	-	500
<b>Practical</b>									
Pr.1		Civil Engg. Lab-I	-	-	6	50	100		
Pr.2		Civil Engg. Drawing-I	-	-	5	25	50		
Pr.3		Estimation Practice-I (Computer-Aided)	-	-	3	25			
		Student Centered Activities(SCA)		-	3	-	-	-	-
		<i>Total</i>	-	-	17	100	150	-	250
		<b>Grand Total</b>	<b>22</b>	<b>-</b>	<b>17</b>	<b>200</b>	<b>550</b>	<b>-</b>	<b>750</b>

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.**

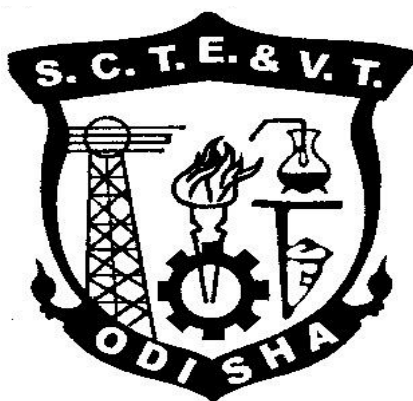
**There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester**

# **CURRICULLUM OF 3<sup>RD</sup> SEMESTER**

**For**

**DIPLOMA IN CIVIL ENGINEERING**

**(Effective From 2019-20 Session)**



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

# Th1. STRUCTURAL MECHANICS

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	3 <sup>rd</sup>
Total Period:	75	Examination	3 hrs
Theory periods:	5P/week	Internal Assessment:	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 structural members. The students will develop competency in calculating necessary dimensions and material properties so that the members can withstand the loading conditions.

## B. COURSE OBJECTIVES

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

1. Comprehend, define, compute and interpret major mechanical properties demonstrated by solid materials.
2. Analyze solid states under uniaxial loading and plane stress conditions.
3. Draw shear force and bending moment diagrams of simple statically determinate and statically indeterminate structural members subject to transverse loading.
4. Obtain slope and deflection profiles of statically determinate simple structural members.
5. Comprehend buckling as a failure mode in column and determine crippling loads for columns using Euler's theory.
6. Compute forces in members of a truss

## C. TOPIC WISE DISTRIBUTION

Chapter	Name of topics	Periods
1	Review of Basic Concepts	04
2	Simple and Complex Stress, Strain	15
3	Stresses in Beams	10
4	Columns and Struts	04
5	Shear Force and Bending Moment	12
6	Slope and Deflection	10
7	Indeterminate Beams	10
8	Trusses and Frames	10

## D. Course Contents:

### 1 Review Of Basic Concepts

**1.1** Basic Principle of Mechanics: Force, Moment, support conditions, Conditions of equilibrium, C.G & MI, Free body diagram

**1.2** Review of CG and MI of different sections

### 2 Simple And Complex Stress, Strain

## **2.1 Simple Stresses and Strains**

Introduction to stresses and strains: Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability, Types of stresses -Tensile, Compressive and Shear stresses, Types of strains - Tensile, Compressive and Shear strains, Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear, Elongation and Contraction, Longitudinal and Lateral strains, Poisson's Ratio, Volumetric strain, computation of stress, strain, Poisson's ratio, change in dimensions and volume etc, Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants.

## **2.2 Application of simple stress and strain in engineering field:**

Behaviour of ductile and brittle materials under direct loads, Stress Strain curve of a ductile material, Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress, Percentage elongation, Percentage reduction in area, Significance of percentage elongation and reduction in area of cross section, Deformation of prismatic bars due to uniaxial load, Deformation of prismatic bars due to its self weight.

## **2.3 Complex stress and strain**

Principal stresses and strains: Occurrence of normal and tangential stresses, Concept of Principal stress and Principal Planes, major and minor principal stresses and their orientations, Mohr's Circle and its application to solve problems of complex stresses

# **3**

## **Stresses In Beams and Shafts**

**3.1 Stresses in beams due to bending:** Bending stress in beams – Theory of simple bending – Assumptions – Moment of resistance – Equation for Flexure– Flexural stress distribution – Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus

**3.2 Shear stresses in beams:** Shear stress distribution in beams of rectangular, circular and standard sections symmetrical about vertical axis.

**3.3 Stresses in shafts due to torsion:** Concept of torsion, basic assumptions of pure torsion, torsion of solid and hollow circular sections, polar moment of inertia, torsional shearing stresses, angle of twist, torsional rigidity, equation of torsion

**3.4 Combined bending and direct stresses:** Combination of stresses, Combined direct and bending stresses, Maximum and Minimum stresses in Sections, Conditions for no tension, Limit of eccentricity, Middle third/fourth rule, Core or Kern for square, rectangular and circular sections, chimneys, dams and retaining walls

## **4 Columns and Struts**

**4.1 Columns and Struts,** Definition, Short and Long columns, End conditions, Equivalent length / Effective length, Slenderness ratio, Axially loaded short and long column, Euler's theory of long columns, Critical load for Columns with different end conditions

## **5 Shear Force and Bending Moment**

### **5.1 Types of loads and beams:**

Types of Loads: Concentrated (or) Point load, Uniformly Distributed load (UDL), Types of Supports: Simple support, Roller support, Hinged support, Fixed support, Types of Reactions: Vertical reaction, Horizontal reaction, Moment reaction, Types of Beams based on support conditions: Calculation of support reactions using equations of static equilibrium.

### **5.2 Shear force and bending moment in beams:**

Shear Force and Bending Moment: Signs Convention for S.F. and B.M, S.F and B.M of general cases of determinate beams with concentrated loads and udl only, S.F and B.M diagrams for Cantilevers, Simply supported beams and Over hanging beams, Position of maximum BM, Point of contra flexure, Relation between intensity of load, S.F and B.M.

## **6 Slope and Deflection**

**6.1 Introduction:** Shape and nature of elastic curve (deflection curve); Relationship between slope, deflection and curvature (No derivation), Importance of slope and deflection.

**6.2** Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).

## **7 Indeterminate Beams**

**7.1** Indeterminacy in beams, Principle of consistent deformation/compatibility, Analysis of propped cantilever, fixed and two span continuous beams by principle of superposition, SF and BM diagrams (point load and udl covering full span)

## **8 Trusses**

**8.1 Introduction:** Types of trusses, statically determinate and indeterminate trusses, degree of indeterminacy, stable and unstable trusses, advantages of trusses.

## 8.2 Analysis of trusses: Analytical method ( Method of joints, method of Section)

**E. Course Coverage Upto Internal Assessment:** Chapters 1,2,3,4

### **F. Recommended Books**

<b>Sl. No</b>	<b>Name of Authors</b>	<b>Titles of Book</b>	<b>Name of Publisher</b>
1	R.Subramanian	Strength of Materials	Oxford Publication
2	S.Rammrutham,	Theory of structure	Dhanpat Rai Publications
3	V.N.Vazirani&M.M. Rathwani	Analysis of Structures-Vol.I&II	Khanna Publication

## Th2. GEOTECHNICAL ENGINEERING

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	3 <sup>rd</sup>
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 identify 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	Hours
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
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**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.

# Th3.BUILDING MATERIALS AND CONSTRUCTIONS TECHNOLOGY

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

## A. RATIONALE

The course has two parts namely the materials and construction task. The first part offers insight to the common materials used in construction. This enables students to understand the application and processing requirement in the common construction materials. The second part of the course offers idea on construction activities based on components of a building. Another objective of the course is to develop concept of eco-friendly construction practices.

## B. COURSE OBJECTIVES

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

1. Realize the role of rock, bricks, cement, concrete, timber and steel in construction and comprehend the classification and processing tasks involved.
2. Understand the composition and mechanism of the protective paints and prescribe as necessary.
3. Classify buildings on occupancy and comprehend different components and their requirement in a building.
4. Understand the glossary of terms involved in foundation, masonry, wood works and other activities involved in building construction.
5. Grasp the construction details involved in a building.
6. Realize the significance of protecting environment and adopt necessary practices towards green construction.

## C. TOPIC WISE DISTRIBUTION

### D.

Chapter	Name of topics	Hours
PART A: BUILDING MATERIALS		
1	Stone	05
2	Bricks	06
3	Cement, Mortar and Concrete	07

4	Other Construction Materials	07
5	Surface Protective Materials:	05
<b>PART B: CONSTRUCTIONS TECHNOLOGY</b>		
1	Introduction	02
2	Foundations	04
3	Walls & Masonry Works	06
4	Doors, Windows and Lintels:	04
5	Floors, Roofs and Stairs	05
7	Protective, Decorative Finishes and Termite Proofing	05
8	Green Buildings, Energy Management and Energy Audit of Buildings & Project:	04

## **E. COURSE CONTENTS:**

### ***PART :A (BUILDING MATERIALS)***

#### **1 Stone**

- 1.1 Classification of rock, uses of stone, natural bed of stone,
- 1.2 Qualities of good building stone,
- 1.3 Dressing of stone
- 1.4 Characteristics of different types of stone and their uses

#### **2 Bricks**

- 2.1 Brick earth – its composition
- 2.2 Brick making – Preparation of brick earth, Moulding, Drying, Burning in kilns (continuous Process)
- 2.3 Classification of bricks, size of traditional and modular bricks, qualities of good building bricks

#### **3 Cement, Mortar and Concrete**

- 3.1 Cement: Types of cements, Properties of cements, Manufacturing of cement
- 3.2 Importance and application of blended cement with fly ash and blast furnace slag.
- 3.3 Mortar: Definition and types of mortar
- 3.4 Sources and classification of sand, Bulking of sand
- 3.5 Use of gravel, morrum and fly ash as different building material
- 3.6 Concrete: Definition and composition- Water cement ratio- Workability, mechanical properties and grading of aggregates, mixing, placing, compacting and curing of concrete.

#### **4 Other Construction Materials**

- 4.1 Timber: Classification and Structure of timber.
- 4.2 Seasoning of timber – Importance.
- 4.3 Characteristics of good timber.
- 4.3 Clay products and refractory materials – Definition and Classification.
- 4.4 Properties and uses of refractory materials- tiles, terracotta, porcelain glazing.
- 4.5 Iron and Steel: Uses of cast iron, wrought iron, mild steel and tor steel

## **5 Surface Protective Materials**

- 5.1 Composition of Paints, enamels, varnishes.
- 5.2 Types and uses of surface protective materials like Paints, Enamels, Varnishes, Distempers, Emulsion, French polish and Wax Polish.

## ***PART: B (CONSTRUCTIONS TECHNOLOGY)***

### **1 Introduction**

- 1.1 Buildings and classification of buildings based on occupancy
- 1.2 Different components of a building.
- 1.3 Site investigation – objectives, site reconnaissance and explorations.

### **2 Foundations**

- 2.1 Concept of foundation and its purpose
- 2.2 Types of foundations – shallow and deep
- 2.3 Shallow foundation-constructural details of : Spread foundations for walls, thumb rules for depth and width of foundation and thickness of concrete block
- 2.4 Deep foundations: Pile foundations-their suitability, classification of piles based on materials, function and method of installation.

### **3 Walls & Masonry Works :**

- 3.1 Purpose of walls
- 3.2 Classification of walls – load bearing, non-load bearing walls, retaining walls.
- 3.3 Classification of walls as per materials of construction: brick, stone, reinforced brick, reinforced concrete, precast, hollow and solid concrete block and composite masonry walls (Concept Only).

3.4 Partition Walls : Suitability and uses of brick and wooden partition walls

3.5 Brick masonry : Definition of different terms

3.6 Bond – meaning and necessity: English bond for 1 and 1-1/2 Brick thick walls. T, X and right angled corner junctions. Thickness for 1 and 1-1/2 brick square pillars in English bond

3.7 Stone Masonry :

3.8 Glossary of terms –String course, corbel, cornice, block-in-course, grouting, mouldings, templates, throating, through stones, parapet, coping, pilaster and buttress

## **4 Doors, Windows And Lintels**

4.1 Glossary of terms used in doors and windows

4.2 Doors – different types of doors

4.3 Windows – different types of windows

4.4 Purpose of use of arches and lintels

## **5 Floors, Roofs and Stairs**

5.1 Floors: Glossary of terms ,Types of floor finishes – cast-in-situ, concrete flooring(monolithic, bonded), terrazzo tile flooring, cast in situ Terrazzo flooring, timber flooring (Concept only)

5.2 Roofs: Glossary of terms, Types of roofs, concept and function of flat, pitched, hipped and Sloped roofs

5.3 Stairs: Glossary of terms; Stair case, winder, landing, stringer, newel, baluster, rise, tread, width of stair case, hand rail, nosing, head room, mumty room.

5.4 Various types of stair case – straight flight, dog legged, open well, quarter turn, half turn (newel and geometrical stairs), bifurcated stair, spiral stair, cantilever stair, tread riser stair.

## **6 Protective, Decorative Finishes, Damp and Termite Proofing**

6.1 Plastering – purpose – Types of plastering, Types of plaster finishes – Grit finish, rough cast, smooth cast, sand faced, pebble dash, acoustic plastering and plain plaster etc.

6.2 Proportion of mortars used for different plasters, preparation of mortars, techniques

of plastering and curing

6.3 Pointing – purpose –Types of pointing

6.4 Painting – objectives – method of painting new and old wall surfaces, wood surface and metal surfaces – powder coating and spray painting on metal surfaces.

6.5 White washing – Colour washing – Distempering – internal and external walls.

6.6 Damp and Termite proofing – Materials and Methods.

## **7 Green Buildings, Energy Management and Energy Audit Of Buildings & Project**

8.1 Concept of green building

8.2 Introduction to Energy Management and Energy Audit of Buildings.

8.3 Aims of energy management of buildings.

8.4 Types of energy audit, Response energy audit questionnaire

8.5 Energy surveying and audit report.

**F. Course Coverage up to Internal Assessment:** All of Part A and Chapters 1, 2 of Part B

### **G. RECOMMENDED BOOKS**

<b>Sl. No</b>	<b>Name of Authors</b>	<b>Titles of Book</b>	<b>Name of Publisher</b>
1	N. Subramanian	Building materials & Construction	Oxford Publication
2	Rangwala	Engineering Materials	Charorar Publishing House
3	Rangwala	Building Construction	Charorar Publishing House
4	Sarkar & Saraswati	Construction Technology	Oxford Publication

## Th4. ESTIMATION & COST EVALUATION – I

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	4 <sup>th</sup>
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	Hours
1	Introduction :	02
2	Quantity Estimate of Building	30
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

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



## Th5. ENVIRONMENTAL STUDIES (Common to All Branches)

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	3 <sup>rd</sup>
Total Period:	60	Examination :	3 hrs
Theory periods:	4P / week	Internal Assessment:	20
Maximum marks:	100	End Semester Examination	80

### A. Rationale:

Due to various aspects of human developments including the demand of different kinds of technological innovations, most people have been forgetting that, the Environment in which they are living is to be maintained under various living standards for the preservation of better health. The degradation of environment due to industrial growth is very much alarming due to environmental pollution beyond permissible limits in respect of air, water industrial waste, noise etc. Therefore, the subject of Environmental Studies to be learnt by every student in order to take care of the environmental aspect in each and every activity in the best possible manner.

### B. OBJECTIVES:

After completion of study of environmental studies, the student will be able to:

1. Gather adequate knowledge of different pollutants, their sources and shall be aware of solid waste management systems and hazardous waste and their effects.
2. Develop awareness towards preservation of environment.

### C. TOPIC WISE DISTRIBUTION OF PERIODS

SL.NO.	TOPIC	PERIODS
1	The Multidisciplinary nature of environmental studies	04
2	Natural Resources	10
3	Systems	08
4	Biodiversity and it's Conservation	08
5	Environmental Pollution.	12
6	Social issues and the Environment	10
7	Human population and the environment	08
	<b>TOTAL</b>	60

#### Unit 1: The Multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness.

#### Unit 2: Natural Resources

**Renewable and non renewable resources:**

- a) Natural resources and associated problems.

- Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction mining, dams and their effects on forests and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
- Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
- Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers- pesticides problems, water logging, salinity, .
- Energy Resources: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
- Land Resources: Land as a resource, land degradation, man induces landslides, soil erosion, and desertification.

b) Role of individual in conservation of natural resources.

c) Equitable use of resources for sustainable life styles.

### **Unit 3: Systems**

- Concept of an eco system.
- Structure and function of an eco system.
- Producers, consumers, decomposers.
- Energy flow in the eco systems.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following eco system:
- Forest ecosystem:
- Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries).

### **Unit 4: Biodiversity and it's Conservation**

- Introduction-Definition: genetics, species and ecosystem diversity.
- Biogeographically classification of India.
- Value of biodiversity: consumptive use, productive use, social ethical, aesthetic and optin values.
- Biodiversity at global, national and local level.
- Threats to biodiversity: Habitats loss, poaching of wild life, man wildlife conflicts.

### **Unit 5: Environmental Pollution.**

Definition Causes, effects and control measures of:

- a) Air pollution.
- b) Water pollution.
- c) Soil pollution
- d) Marine pollution
- e) Noise pollution.
- f) Thermal pollution
- g) Nuclear hazards.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Disaster management: Floods, earth quake, cyclone and landslides.

### **Unit 6: Social issues and the Environment**

- Form unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, water shed management.
- Resettlement and rehabilitation of people; its problems and concern.
- Environmental ethics: issue and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.
- Air (prevention and control of pollution) Act.
- Water (prevention and control of pollution) Act.
- Public awareness.

### **Unit 7: Human population and the environment**

- Population growth and variation among nations.
- Population explosion- family welfare program.
- Environment and human health.
- Human rights.
- Value education
- Role of information technology in environment and human health.

### **Syllabus coverage upto I.A**

#### **Units 1, 2, 3**

<b>Learning Resources:</b>			
<b>SI.No</b>	<b>Title of the Book</b>	<b>Name of Authors</b>	<b>Name of Publisher</b>
1.	Textbook of Environmental studies	Erach Bharucha	#UGC
2.	Fundamental concepts in Environmental Studies	D.D. Mishra	S.Chand&Co-Ltd
3.	Text book of Environmental Studies	K.Raghavan Nambiar	SCITECH Publication Pvt. Ltd
4.	Environmental Engineering	V.M.Domkundwar	Dhanpat Rai & Co

# Pr1. CIVIL ENGINEERING LABORATORY-I

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	3 <sup>rd</sup>
Total Period:	90	Examination	3 hrs
Lab. periods:	6P/week	Term Work	50
Maximum marks:	150	End Semester Examination:	100

## A. RATIONALE

The course exposes the students to different test facilities and their usage methods to determine characteristics of Civil Engineering materials.

## B. COURSE OBJECTIVES

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

1. Use Universal testing machine to determine the stress-strain relation in steel.
2. Carry out tests to determine cement characteristics and strength.
3. Investigate properties of aggregates
4. Conduct tests to determine concrete workability and compressive strength
5. To perform non-destructive tests on concrete
6. To conduct strength tests on different types of bricks

## D. TOPIC WISE DISTRIBUTION

Chapter	Name of topics	Hours
1	MATERIAL TESTING LABORATORY	60
2	CONCRETE LABORATORY	30

## E. COURSE CONTENTS

### I. Material Testing Laboratory:

#### 1. Test on Steel

Determination of Young's Modulus of steel in a tensile testing machine.

#### 2. Tests on Cement, Sands, Bricks, Blocks & Aggregates

- 2.1 Determination of fineness of Cement by sieving.
- 2.2 Determination of normal Consistency, initial and final setting time of Cement
- 2.3 Determination of soundness of Cement by Le-Chatelier apparatus.
- 2.4 Determination of Compressive Strength of cement.
- 2.5 Determination of Compressive Strength of Burnt clay, Fly Ash Bricks and Blocks.

- 2.6 Grading of Fine & Coarse aggregate by sieving for concrete .
- 2.7 Determination of Specific Gravity and Bulking of sand.
- 2.8 Determination of Specific Gravity and Bulk density of coarse aggregate.
- 2.9 Grading of Road Aggregates.
- 2.10 Determination of Flakiness, Elongation of Road aggregates.
- 2.11 Determination of Crushing Value Test of aggregates.
- 2.12 Los-Angeles Abrasion Test of aggregate.
- 2.13 Impact test of aggregate.
- 2.14 Determination of soundness test of road aggregates.

## II. Concrete Laboratory

- 3.1 Determination of Compressive Strength of concrete cubes.
- 3.2 Determination of Workability of concrete by:
  - a) Slump Cone method,
  - b) Compaction Factor method.
- 3.3 Non Destructive tests on Concrete:
  - a) Demonstration on Rebound hammer
  - b) Ultrasonic Pulse Velocity measuring Instrument.

## F. RECOMMENDED BOOKS

Learning Resources			
Text Books			
Sl. No	Name of Authors	Titles of Book	Name of Publisher
1	M. L. Gambhir	Concrete Manual-A Laboratory Manual For Quality of Concrete	Dhanpat Rai & Co. Pvt. Ltd.
2	Dr. M.Chakraborty	Cement,Aggregate and concrete Laboratory Manual	
3	S.K.Khanna & C.E.G.Justo	Highway material testing Laboratory manual	Nem Chand & Bros,Roorkee,India
4	Ajay K. Duggal & Vijay P Puri	Laboratory manual in Highway Engg.	New Age Int.Publishers
5	Dr.M.R.Samal	Civil Engineering Laboratory Practice-I	Kalyani Publishers

## Pr2. CIVIL ENGINEERING DRAWING-I

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	3 <sup>rd</sup>
Total Period:	75	Examination	2 hrs
Theory periods:	5P/week	Term Work	25
Maximum marks:	75	End Semester Examination:	50

### A. RATIONALE

The course aims to prepare the students to use modern engineering tools to prepare building drawings.

### B. COURSE OBJECTIVES

After completion of the course, students will be able to

CO1- Use AutoCAD modules to prepare engineering drawings

CO2- Comprehend various drawing commands available in CAD software

CO3- Prepare plan, elevation and section views of flat roof buildings

CO4- Prepare plan, elevation and section views of inclined roof buildings

CO5- Generate drawings of building citing material differences

CO6- Generate building plans following prescribed regulations in established codes.

### C. TOPIC WISE DISTRIBUTION

Chapter	Name of topics	Hours
1	AutoCAD software	25
2	Plan, elevation and sectional elevation of flat roof building from line diagram and given specifications using AutoCAD software	25
3	Plan, elevation and section of inclined roof building with a/c sheet/gci/tiles on wooden structure using AutoCAD software	10
4	Building planning	15

### D. COURSE CONTENTS

#### 1. AutoCAD SOFTWARE.

1.1 Recap of the Draw, Format, Edit, Dimension, Modify commands

1.2 Draw 2D drawings of the following Building Components - Doors, Windows, Cross section through wall, Spread footing, Column footing, Stairs case, R.C.C. T-beam and slab

1.3 Develop Isometric drawings of simple objects

1.4 Develop 3D drawings of simple objects.

#### 2. PLAN, ELEVATION AND SECTIONAL ELEVATION OF FLAT ROOF BUILDING FROM LINE DIAGRAM AND GIVEN SPECIFICATIONS with use of AutoCAD software.

2.1 Plan at window sill level of a single storeyed R.C. roof slab building with elevation and sectional views form given line diagram and specification.

2.2 Detail drawing of Double storeyed pucca building with R.C.C. stair case from line diagram and given specification.

2.3 Preparation of approval drawing of a residential building as per the norms of local approving authority with site plan, index plan etc.

**3 PLAN, ELEVATION AND SECTION OF INCLINED ROOF BUILDING WITH AC SHEET/GCI/TILES ON WOODEN STRUCTURE with use of AutoCAD Commands**

Detail drawing of inclined roof building from given line diagram and specification. (gabled / hipped)

**4. BUILDING PLANNING**

4.1 Planning of buildings for specific cost based on approximate plinth area rate.

4.2 Orientation of buildings, location of openings and living areas.

4.3 Line plan of School, hostel, market complex and dispensary building.

**E. RECOMMENDED BOOKS**

<b>Learning Resources</b>			
<b>Text Books</b>			
<b>Sl. No</b>	<b>Name of Authors</b>	<b>Titles of Book</b>	<b>Name of Publisher</b>
1	M.Chakrobarty	Civil Engg. Drawing	M.Chakrobarty
2	B.P.Verma	Civil Engineering drawing &House Planning	Khanna Publishers
3	Govt Of India	IS12556, 10713&I.S-696	BIS Publication
4	V.Thanikachalama & K.V Natarajan	Civil Engineering drawing Manual	S Chand & Co Pvt Ltd
5	G.V.Krishnan & Thomas A. Stellman	Harnessing AutoCAD	Delmar Cengage Learning
	George Omura	Mastering AutoCAD	Sybex
	William G. Wyatt	AutoCAD (Architecture) –latest edition	Delmar Cengage Learning

## Pr3. ESTIMATING PRACTICE

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	4 <sup>th</sup>
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	Hours
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

<b>Learning Resources</b>			
<b>Text Books</b>			
<b>Sl. No</b>	<b>Name of Authors</b>	<b>Titles of Book</b>	<b>Name of Publisher</b>
1	M.Chakrobarty	Estimating, Costing, specification & Valuation in Civil Engineering	Chakrobarty
2	B.N.Dutta	Estimating & Costing in Civil Engg.	UBS Publishers' Distributors Pvt. Ltd
3	G.S.Birdie	Text Book of Estimating & Costing	Dhanpat Rai Publishing Company Pvt. Ltd
4	Govt. of Odisha	Latest Orissa PWD Schedule of Rates & Analysis of rates	Govt. of Odisha