**REVISED CURRICULUM OF**
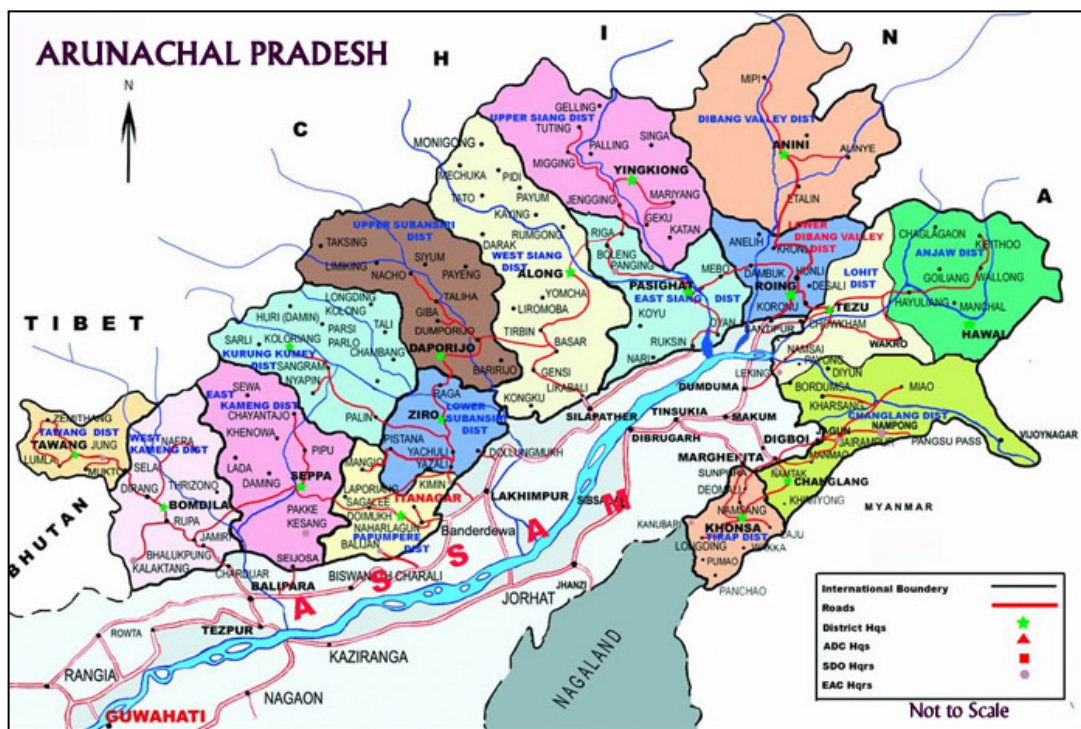
# CIVIL ENGINEERING DIPLOMA PROGRAMME

## IN

# MULTI POINT ENTRY & CREDIT SYSTEM



## For the State of Arunachal Pradesh

PART - II

REVISED CURRICULUM OF PART – II

# CIVIL ENGINEERING DIPLOMA PROGRAMME

**IN MULTI POINT ENTRY & CREDIT SYSTEM**



NATIONAL INSTITUTE OF TECHNICAL TEACHERS'
TRAINING AND RESEARCH
**Block – FC, Sector – III, Salt Lake City, Kolkata – 700106**

*February 2013*

# Foreword

Government of Arunachal Pradesh has entrusted NITTTR, Kolkata for revising the existing course curricula in eight subject areas and for developing the new course curricula in the two areas.

**Revised Course Curricula:**

1.  Herbal Technology
2.  Garment and Fashion Technology
3.  Hotel Management and Catering Technology
4.  Travel and Tourism Management
5.  Electrical and Electronics Engineering
6.  Civil Engineering
7.  Computer Science and Engineering
8.  Automobile Engineering

**New Course Curricula:**

1.  Electronics and Communication Engineering
2.  Electrical Engineering
3.  Mechanical Engineering

The Institute conducted a series of workshop involving experts in different subject areas for development of the course curricula. An effort has also been made to ensure that the revised course curricula do not deviate significantly from the existing course curricula and at the same time reflect the recent trends in a particular subject area.

The Institute welcomes any meaningful suggestions which can be incorporated in the final versions of the above said document.

Sd/-
(Prof. S. K. Bhattacharyya)
Director
NITTTR, Kolkata

# Table of Contents

## BASIC TECHNOLOGY COURSES

| Sl. No | Code | Course | Pre-requisite | Study Scheme | | | Evaluation Scheme | | | | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Contact Hour/Week | | | Theory | | | Practical | | | | |
| | | | | L | T | P | End Exam | Progressive Assessment | | End Exam | Progressive Assessment | | | |
| | | | | | | | | Class Test | Assignment | | Sessional | Viva | | |
| 1. | CE401 | Building Material | | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 2. | CE 402 | Hydraulics | | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 3. | CE 403 | CE Drawing – I | G201 & G202 | 0 | 0 | 4 | 0 | 0 | 0 | 50 | 50 | 0 | 100 | 2 |
| 4. | CE 404 | CE Drawing – II | CE403 | 0 | 0 | 4 | 0 | 0 | 0 | 50 | 50 | 0 | 100 | 2 |
| 5. | CE 405 | Surveying – I | | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 6. | CE 406 | Structural Mechanics | G205 | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 7. | CE 407 | Geotechnical Engg I | | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 8. | CE 408 | Theory of Structure | CE406 | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 9. | CE 409 | Water & Waste Water Engg | CE402 | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 10. | CE 410 | Building Construction | CE401 | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| | | **TOTAL** | | **24** | **8** | **18** | **600** | **80** | **120** | **250** | **250** | **0** | **1250** | **41** |

## APPLIED TECHNOLOGY COURSES

| Sl. No | Code | Course | Study Scheme Pre-requisite | Contact Hour/Week L | T | P | Theory End Exam | Progressive Assessment Class Test | Assign ment | Practical End Exam | Progressive Assessment Sessio nal | Viva | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | CE501 | Highway & Transportation Engg. | | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 2. | CE 502 | Geotechnical Engineering II | CE407 | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 3. | CE 503 | Water Resource Engg | CE 402 | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 4. | CE 504 | Estimating I | | 2 | 2 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 5. | CE 505 | Estimating II | CE 504 | 2 | 2 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 6. | CE 506 | Surveying II | CE 405 | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 7. | CE 507 | Design & Detailing of Structure – I | CE 406 | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 8. | CE 508 | Concrete Technology | CE 401 | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 9. | CE 509 | Design & Detailing of Structure II | CE 406 | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 10. | CE 510 | Earthquake Resistant Design & Construction | CE 408 & CE509 | 3 | 0 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 3 |
| 11. | CE 511 | Technical Seminar | | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 50 | 50 | 100 | 2 |
| 12. | CE 512 | Project | | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 100 | 50 | 150 | 4 |
| 13. | CE 513 | Industrial Training (3 weeks OJT + 1 week orientation)* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 100 | 200 | 10 |
| | | **TOTAL** | | **28** | **11** | **24** | **750** | **100** | **150** | **125** | **375** | **200** | **1700** | **60** |

* Students must be either in 4th term or higher.

**ELECTIVE COURSES: TWO to be taken, One Practical based and other Theory based**

| Sl. No | Code | Course | Study Scheme | | | | Evaluation Scheme | | | | | | Total Marks | Credit |
| | | | Pre-requisite | Contact Hour/Week | | | Theory | | | Practical | | | | |
| | | | | L | T | P | End Exam | Progressive Assessment | | End Exam | Progressive Assessment | | | |
| | | | | | | | | Class Test | Assign ment | | Sessio nal | Viva | | |
| 1. | CE601A | Professional Practice & Construction Management | | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 2. | CE 601B | Environmental Engg. | | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 3. | CE 601C | Tunnels & Bridges | | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 4. | CE 602A | Advanced Survey | | 1 | 0 | 4 | 0 | 0 | 0 | 50 | 25 | 25 | 100 | 3 |
| 5. | CE 602B | Computer Aided Drawing & Design | | 1 | 0 | 4 | 0 | 0 | 0 | 50 | 25 | 25 | 100 | 3 |
| | | **TOTAL** | | **4** | **1** | **4** | **75** | **10** | **15** | **50** | **25** | **25** | **200** | **7** |

# BASIC TECHNOLOGY COURSES

# BUILDING MATERIALS

| L | T | P | | *Curri. Ref. No.: CE401* |
|---|---|---|---|---|
| 3 | 1 | 2 | | |

**Total Contact hrs.:**      **Total marks: 150**      **Theory:**
*Theory: 45 Tutorial 15*      *End Term Exam: 75*
*Practical: 30*      *P.A.: 25*
**Theory Class duration:**      **Practical:**
*45 classes of 1hr. or*      *End Term Exam: 25*
*60 classes of 45 minutes*      *I.A : 25*
**Pre requisite: Nil**
**Credit: 5**

## RATIONALE:

The subject of building material is very important for the diploma holders in Civil Engineering. The course material has been designed for the students to know the properties of the building materials as well as the strength of the material as per IS code of practice. Further, practical input has been given for augmenting the learning by the students.

## AIM:

To know the properties of different materials for use and quality control in construction works

THEORY: 45 hrs.

| Unit | | Topic/Sub-Topic | Hrs. | Total Hrs. |
|---|---|---|---|---|
| 1.0 | | INTRODUCTION | | 1 |
| | 1.1 | Different types of materials used in construction. | | |
| | 1.2 | Definition of engineering materials | | |
| 2.0 | | BRICK | | 4 |
| | 2.1 | Classification, composition, preparation, properties of bricks | | |
| 3.0 | | LIME | | 2 |
| | 3.1 | Classification, composition & use | | |
| 4.0 | | CEMENT | | 6 |
| | 4.1 | Classification, composition, types, grades | | |
| | 4.2 | Manufacturing of cement | | |
| | 4.3 | Uses of Cement, testing of Cement. | | |
| | 4.4 | Discussion on relevant I.S codes. | | |
| 5.0 | | SAND | | 3 |
| | 5.1 | Classification, zoning of sand, bulking factor, testing of sand | | |
| | 5.2 | Discussion on relevant I.S. codes. | | |
| 6.0 | | STONE | | 6 |
| | 6.1 | Classification of rocks | | |
| | 6.2 | Characteristics of different types of stones | | |

|      | 6.3  | Uses of different types of stone based on size |     |
|------|------|------------------------------------------------|-----|
|      | 6.4  | Grading of aggregates                          |     |
|      | 6.5  | Testing of stone aggregates                    |     |
|      | 6.6  | Discussion on relevant IS codes                |     |
| 7.0  | TIMBER |                                              | 4   |
|      | 7.1  | Classification of timber, structure of timber trees |  |
|      | 7.2  | Defects of timber, diseases and decay of timber |   |
|      | 7.3  | Seasoning, preservation and uses of timber.    |     |
|      | 7.4  | Replacement of timber by other alternate materials | |
| 8.0  | REFRACTORY MATERIALS AND CLAY PRODUCTS, CONCRETE TILES, MARBLES | 2 |
|      | 8.1  | Definition, classification, properties and uses. | |
|      | 8.2  | Introduction to tiles, marbles, terracotta, porcelain, glazing | |
|      | 8.3  | Ideas on market form of products               |     |
| 9.0  | MORTAR AND CONCRETE |                             | 4   |
|      | 9.1  | Types of mortar and concrete, uses of mortar and concrete | |
| 10.0 | STEEL AND OTHER MATERIALS |                       | 4   |
|      | 10.1 | Different use of steel in construction: Reinforcement and Structural Steel as per IS code | |
|      | 10.2 | Other materials: Plastic Fiber, PVC            |     |
| 11.0 | WHITE WASHING AND PAINTING |                      | 6   |
|      | 11.1 | White washing, colour washing, distempering    |     |
|      | 11.2 | Painting, different type of paints, manufacturing of paints | |
| 12.0 | FORMATIVE EVALUATION |                            | 3   |
|      |      | **TOTAL:**                                     | **45** |

**PRACTICAL**

| Unit | Topic/Sub-Topic | Hrs. | Total hrs. |
|------|-----------------|------|-----------|
| 1.0  | Compressive Strength of Brick |  |  |
| 2.0  | Water Absorption of Brick |  |  |
| 3.0  | Effloverscence of Brick |  |  |
| 4.0  | Warpage of Brick |  |  |
| 5.0  | Compressive Strength of Brick masonry by Prism Test |  |  |
| 6.0  | Grading of Course and Fine Aggregate |  |  |
| 7.0  | Bulking of Sand |  |  |
| 8.0  | Specific Gravity of Fine Aggregate |  |  |
| 9.0  | Tensile Test of Reinforced Rod |  |  |
| 10.0 | Bend & Rebend |  |  |
| 11.0 | Testing of Timber Beam for Flexural Strength |  |  |
|      | **TOTAL:** |  | **30** |

**REFERENCE OF BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Materials of Construction | D.N.Ghosh | Tata Mc-Grew Hills |
| 2. | Building Materials | P. C. Varghese | PHI Learning |
| 3. | Building Materials | S. K. Duggal | New Age International |
| 4. | Engineering Materials | Rangwala | Charotar Publishing House |
| 5. | Building Material and Construction | Gurcharan Singh | Standard Book House |
| 6. | National Building Code | | Bureau of Indian Standard |

# HYDRAULICS

## RATIONALE:

The subject of Hydraulics deals with behaviour of fluid at rest and in motion. The Civil Engineering profession is much concerned with subjects like Water supply, sanitary Engineering and irrigation Engineering, which need a sound knowledge of Hydraulics. Therefore, hydraulics is a very important basic subject for students of civil engineering.

## AIM:

To develop basic concepts regarding behaviour of fluid, specially water, at rest and in motion.

## THEORY

| Unit | Topic/Sub-Topic | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | HYDROSTATICS: | | 12 |
| | 1.1   Properties of fluids, density, specific gravity, surface tension, capillarity, viscosity and their uses | | |
| | 1.2   Pressure and its measurements : Definitions- intensity of pressure, atmospheric pressure, gauge pressure, absolute pressure and vacuum pressure; Relation between atmospheric pressure, absolute pressure and gauge pressure, pressure head, pressure gauges | | |
| | 1.3   Pressure exerted on an immersed surface; Definitions- total pressure, resultant pressure, expression of equation for total pressure exerted on horizontal, vertical and inclined immersed surface (No deduction); Center of pressure and its expression. | | |
| | 1.4   Floatation and buoyancy: Archimedes principle- buoyancy & center of buoyancy, center of pressure, metacenter, metacentric height, determination of metacentric height by experimental method, equilibrium of floating bodies- stable, unstable & neutral equilibrium | | |
| 2.0 | KINEMATICS OF FLUID FLOW | | 26 |

2.1 Basic equations of fluid flow and their application (No deduction): rate of discharge, equation of continuity of a liquid flow, total energy of a liquid in motion- potential, kinetic & pressure, Bernoulli's theorem and its limitations. Practical applications of Bernoulli's equation.

2.2 Flow through Orifices: orifices, types of orifices, venacontracta, hydraulic coefficients and their relations, determination of hydraulic coefficients, discharge formulae for different types of orifices and their application (No deduction)

2.3 Flow through mouthpieces: mouthpieces, types of mouthpieces, discharge formulae for different types of mouthpieces and their application (No deduction)

2.4 Flow over Notches: notch, types of notches, discharge formulae for different types of notches and their application (No deduction)

2.5 Flow over Weirs: weir and its difference with notches, types of weirs, discharge formulae for different types of weirs and their application (No deduction)

2.6 Types of Flow through pipes: uniform & non-uniform; laminar & turbulent; steady & unsteady; Reynold's number and its implication.

2.7 Losses of head of a liquid flowing through pipes: due to friction (statement of Darcy's equation), sudden enlargement, sudden contarction, change of direction of flow, loss at inlet & exit (No deduction, only statement of formulae and their application), total energy lines and hydraulic gradient lines.

2.8 Flow through Open Channels: types of channel sections-rectangular, trapezoidal & circular, Discharge formulae-Chazy's and Manning's equation, best economical section, phenomenon of hydraulic jump ( only description and no deduction)

3.0 PUMPS                                                                    4

3.1 Types of pumps

3.2 Centrifugal pumps- basic principles, discharge, horse power of pump, efficiency of centrifugal pump, simple numerical problems

3.3 Reciprocating pumps: types, operation, discharge, calculation of horse power, efficiency, simple numerical problems

4.0 FORMATIVE EVALUATION                                                     3

**TOTAL:**                                                                   **45**

**PRACTICAL**

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| 5.0 | HYDRAULIC LAB PRACTICAL | | 30 |
| 5.1 | Determination of metacentric height of a floating body | | |
| 5.2 | Verification of Bernoulli's theorem | | |
| 5.3 | Determination of the co-efficients of discharge, contraction and velocity of an orifice | | |
| 5.4 | Determination of coefficient of discharge of a rectangular notch fitted in an open channel | | |
| 5.5 | Determination of coefficient of discharge of a V- notch fitted in an open channel | | |
| 5.6 | Determination of coefficient of discharge of a venturimeter, orificemeter fitted in a pipe | | |
| 5.7 | Determination of head loss due to friction and coefficient of friction for flow through pipes. | | |
| 5.8 | Study of the parts of a centrifugal pump and determination of efficiency | | |
| 5.9 | Study of the parts of a reciprocating pump and determination of efficiency | | |
| 5.10 | Demonstration of discharge measurement by a current meter | | |
| | **TOTAL:** | | **30** |

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Hydraulics | Cruise James F. | Cengage |
| 2. | Hydraulic and Fluid Mechanics | P. N. Modi | Standard Book House |
| 3. | Fluid Mechanics | S.C. Rangwala | Charotar Publishing House |
| 4. | Introduction Fluid Mechanics | Fay | PHI Learning |
| 5. | Fluid Mechanics, 2nd ed. | Mohanty | PHI Learning |
| 6. | Solid and Fluid Mechanics | Bhavikatti, S. S. | New Age International (P) Ltd. |
| 7. | Fluid Mechanics Through Problems | Garde, R. J. | New Age International (P) Ltd. |
| 8. | Fluid Mechanics and its Applications | Gupta, Vijay | New Age International (P) Ltd. |
| 9. | Introduction to Fluid Mechanics & Fluid Machines | Som & Biswas | TMH |
| 10. | Fluid Mechanics | F. White | TMH |
| 11. | Introduction to Fluid Mechanics | Edward J. Shaughnessy, Ira M. Katz & James P. Schaffer | Oxford University Press |

# CIVIL ENGINEERING DRAWING – I

| L | T | P | | *Curri. Ref. No.: CE403* |
|---|---|---|---|---|
| 0 | 0 | 4 | | |

*Total Contact hrs.:*     *Total marks: 100*     *Practical:*
*Practical: 60*                                        *End Term Exam: 50*
**Pre requisite: 201 & 202**                        *I.A : 50*
**Credit: 2**

**RATIONALE:**

This subject is very important for diploma holders in Civil Engineering as this subject provides an input to the students to draw the different structural elements accurately to a chosen scale as required for construction. The students are required to make working drawings showing all different components of a structure so that the same may be easily read and the construction of different units of structures can be done once the working drawings are made available to the constructors.

**AIM:**

The subject aims to introduce the various parameters, which are required for drawing the geometric figures as well as components of different types of structures.

| Unit | Topic/Sub-Topic | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | INTRODUCTION: | | 4 |
| | 1.1   Introduction of civil engineering drawing – foundation plinth, conventional signs of brick masonry, stone masonry, concrete, use of scales (Plate No. 1) | | |
| 2.0 | DOORS AND WINDOWS: | | 8 |
| | 2.1   Different types of doors and windows with their parts (Plate No. 2) | | |
| 3.0 | ROOF TRUSSES: | | 8 |
| | 3.1   Different types of roof trusses such as king post trusses, queen post trusses (Plate No. 3) | | |
| 4.0 | STAIR CASE: | | 12 |
| | 4.1   Conventional sign of staircase, introduction of quarter turn, newel, dog legged, open well newel, open well geometrical, bifurcated, half turn geometrical staircases – only plan (Plate No. 4)<br>Plan and elevation of newel & dog-legged staircase (Plate No. 5) | | |
| 5.0 | BUILDING DRAWING: | | 24 |
| | 5.1   Plan, elevation and section of simple single storeyed building with masonry wall with: | | |
| |     • Sloped roof with steel trusses | | |
| |     • RCC roof slabs with lintel | | |
| |     • Assam type building (Plate No. 6, 7, 8) | | |

5.2 Development of two storeyed building from line plans and specifications with details
- Site Plan
- Plan
- Elevation
- Foundation plan
- Sectional elevations

(Plate No. 9)

6.0 FORMATIVE EVALUATION                                4

**TOTAL:                60**

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Civil Engineering Drawing & Design | D. N. Ghosh | CBS Publishers |
| 2. | Civil Engineering Drawing | S.C. Rangwala | Charotar Publishing House |
| 3. | Building Drawing and Planning with an Integrated Approach | Shah | TMH |
| 4. | Engineering Drawing and Graphics + AutoCAD | Venugopal, K. | New Age International (P) Ltd. |
| 5. | Civil Engineering Drawing | Gurcharan Singh | Standard Publishers |
| 6. | A Course in Civil Engineering Drawing | V. B. Sikka | S.K. Kataria & Sons |
| 7. | Building with an Integrated Approach to Built Environment | Kala, Shah & Patki | TMH |
| 8. | Civil Engg. Drawing | TTTI, Bhopal, Work Book | |

# CIVIL ENGINEERING DRAWING - II

*L        T        P*                                          ***Curri. Ref. No.: CE404***
*0        0        4*

**Total Contact hrs.:**              **Total marks: 100**        **Practical:**
*Practical: 60*                                                  *End Term Exam: 50*
**Pre requisite: CE403**                                         *I.A : 50*
**Credit: 2**


**RATIONALE:**

This subject deals with drawing to be made for different components of sanitary engineering, bridges & culverts, roads & railways and blue prints to be made of the drawings. This also relates to preparation of working drawing as required for actual drawing.

**AIM:**

To prepare the students to draw working drawing for different items pertaining to sanitary & water supply, bridges & culverts, roads & railways, plan, elevation & sections of RCC building etc. and to introduce the skill of computer aided drafting.


| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|------|-----------------|------|------------|
| 1.0 | SANITARY ENGINEERING | 08 | |
| | 1.1 Plan, Sectional elevation of sanitary latrine with septic tanks, inspection chambers, manholes, soak pits showing soil pipe connection. (Plate No. 1) | | |
| 2.0 | BRIDGE AND CULVERTS: | 12 | |
| | 2.1 Plan, elevation, section of simple (i) timber bridge (ii) RCC bridge either freely supported hollow circular type(single span) or RC balanced cantilever (single span) as constructed by the local PWD. Drawings may be shown(from the existing blue-print) (Plate No. 2) | | |
| | 2.2 Plan, elevation, section of a box culvert and hume pipe, culvert, RCC slab culvert, Drawing and Models may be shown (Plate No. 3) | | |
| 3.0 | ROADS AND RAILWAYS: | 08 | |
| | 3.1 Cross Section of (i) National highway/ state highway (ii) Major district road (iii) Minor district road (Plate NO. 4) | | |
| | 3.2 Cross-section of Railway for B.G., M.G. and N.G. (Plate No. 5) | | |
| 4.0 | COMPUTER AIDED DRAFTING: (To use the Auto-CAD or any other similar drafting package to produce Civil engineering drawings such as, Plan Elevation, Section, etc. The use of commands will enable the students to perform different activities as listed below.) | 28 | |
| | 4.1 Making of RC or masonry building and Culvert drawings. | | |

4.2     Editing /modifying of existing drawing.
4.3     Dimensioning, drawing section lines and hashed section lines.
4.4     Writing texts on Drawings.
4.5     Display of drawings on Computer screens
4.6     Making use of different settings of drawings related to scale unit, co-ordinate system.

5.0     FORMATIVE EVALUATION                                          04

                                                **TOTAL:              60**


**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---------|--------------|--------|------------|
| 1. | Civil Engineering Drawing & Design | D. N. Ghosh | CBS Publishers |
| 2. | Civil Engineering Drawing | S.C. Rangwala | Charotar Publishing House |
| 3. | Building Drawing and Planning with an Integrated Approach | Shah | TMH |
| 4. | Engineering Drawing and Graphics + AutoCAD | Venugopal, K. | New Age International (P) Ltd. |

# SURVEYING – I

| L | T | P | | *Curri. Ref. No.: CE405* |
|---|---|---|---|---|
| 3 | 1 | 2 | | |

**Total Contact hrs.:**        **Total marks: 150**        *Theory:*
*Theory: 45*                                                  *End Term Exam: 75*
*Tutorial: 15*                                                *P.A.: 25*
*Practical: 30*                                            **Practical:**
**Theory Class duration:**                          *End Term Exam: 25*
*45 classes of 1hr. or*                                    *I.A: 25*
*60 classes of 45 minutes*
**Pre requisite: Nil**
**Credit: 5**

## RATIONALE:

Surveying is an essential component of the day to day work of a Civil Engineering Technician. The job includes conducting detailed surveying, plotting of survey data, preparation of survey maps etc. In view of its importance the course content has been divided into 2 parts and introduced sequentially as Surveying-I and Surveying-II. Each theory course is accompanied by practical course work to provide hands on experience.

The course content of Surveying-I includes the basic concept of surveying, horizontal linear and angular measurements and conducting surveys involving horizontal linear and angular measurements with stress on familiarization with various equipment used. It also includes vertical linear measurements to indicate the profile of the land surface by levelling has also been covered in details

## AIM:

The course content of Surveying -I has been designed to provide adequate information to develop competency in a learner to-

1. Comprehend the concepts of surveying,
2. Carry out horizontal linear and angular measurements using appropriate equipment,
3. Conduct survey work in field using horizontal linear and angular measurements,
4. Record the data observed during the survey work,
5. Plot the survey map from the recorded data,
6. Compute the data required for plotting,
7. Interpret the plotted survey map and compute data from it.
8. Determination of elevations of points on the earth surface, using appropriate equipment,
9. Record the data observed during leveling and compute the data required for plotting
10. Plotting profile map and contour map using recorded data
11. Conducting Plane table survey in field using horizontal linear measurement

**COURSE CONTENT:**

| Unit | Topic/Sub-Topic | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | BASIC CONCEPT AND GENERAL INTRODUCTION: | 02 | |
| | 1.1   Broad aims, definition, uses, principles and classification of survey | | |
| | 1.2   Field work and office work | | |
| 2.0 | MEASUREMENT OF DISTANCE: | 04 | |
| | 2.1   Instruments for measuring distance-Pegs, ranging rods, ranging poles, offset rods, lathes, whites, plumb bob, chain, tape | | |
| | 2.2   Details, types, testing and adjustment of chains | | |
| | 2.3   Direct and indirect ranging (using ranging rod only) | | |
| 3.0 | CHAIN SURVEY | 06 | |
| | 3.1   Definition, principle and use of chain survey | | |
| | 3.2   Well condition triangle, selection of stations, base line, check line, tie line | | |
| | 3.3   Kinds of offsets, methods of locating building nalla/drain etc. | | |
| | 3.4   Instrument for measuring right angles. Cross staff and optical square | | |
| | 3.5   Errors due to incorrect ranging, limiting length of offset, error in length, area and volume due to incorrect chain, cumulating and compensating error, rape correction, numerical problems | | |
| | 3.6   Different obstacles in chaining ,numerical problems | | |
| 4.0 | COMPASS SURVEY | 08 | |
| | 4.1   Definition, basic difference between chain and compass surveying, open and closed travesing with brief description | | |
| | 4.2   Bearing of lines, type of meridians, whole circle and quadrantal system of bearing, fore and back bearing, reduced bearing | | |
| | 4.3   Local attraction, numerical problems | | |
| | 4.4   Brief description of Prismatic and Surveyor's compass, basic differences between prismatic and surveyor's compass | | |
| | 4.5   Brief description of dip of the needle and magnetic declination, variation in magnetic declination, relation between true bearing and magnetic declination, numerical problems | | |
| | 4.6   Methods of traversing with chains and compass plotting of traverse, closing error | | |
| 5.0 | LEVELLING | 10 | |
| | 5.1   Introduction and definition of common terms | | |
| | 5.2   Types of leveling instruments (working principle), leveling staffs | | |
| | 5.3   Temporary and permanent adjustment of level | | |
| | 5.4   Methods of finding out reduced level | | |
| | 5.5   Missing entries in level book | | |

**PRACTICAL**

| Unit | Topic/Sub-Topic | Hrs. | Total hrs. |
|------|-----------------|------|------------|
| 1.0 | HANDLING & USES OF INSTRUMENTS FOR DISTANCE MEASUREMENT: | 02 | |
| | 1.1 Handling and uses of chain, tape, cross-staff, optical and other related instruments and accessories | | |
| 2.0 | CHAIN SURVEY: | 06 | |
| | 2.1 Ranging and measurement of lines by chain and tape | | |
| | 2.2 Laying and measurement offset by various methods | | |
| | 2.3 Chain survey of an area containing simple details and plotting the survey | | |
| 3.0 | COMPASS SURVEY: | 06 | |
| | 3.1 Reading Fore bearing and back bearing | | |
| | 3.2 Measurement of included angle | | |
| | 3.3 Compass survey of a plot of and making it closed traverse | | |
| | 3.4 Plotting of compass survey after making correction for local attraction | | |
| 4.0 | LEVELLING | 10 | |
| | 4.1 Reading of staff | | |
| | 4.2 Setting up a levelling instrument and finding difference of level by fly levelling | | |
| | 4.3 Conducting of longitudinal levelling and cross-section levelling of a proposed road of 500m, taking L-section at 20m | | |
| | 4.4 Plotting of survey from field book and level book | | |
| 5.0 | PLAIN TABLE SURVEY | 06 | |
| | 5.1 Preparing survey map by plotting data obtained by using Plane table | | |
| | **TOTAL:** | | **30** |

**REFERENCE BOOKS :**

| Sl. No. | Name of Book | Author | Publishers |
|---------|--------------|--------|------------|
| 1. | Surveying Volume -1 | Dr. K.R. Arora | Standard Book House |
| 2. | Surveying Volume -2 | Dr. K. R. Arora | Standard Book House |
| 3. | Surveying & Levelling | S.C. Rangwala | Charotar Publishing House |
| 4. | Surveying – Volume 1 | S. Duggal | TMH |
| 5. | Surveying – Volume 2 | S. Duggal | TMH |
| 6. | Surveying & Levelling | N. Bask | TMH |
| 7. | Surveying, 7/e | Bannister | Pearson |
| 8. | Surveying & Levelling | R. Subramanian | Oxford University Press |

# STRUCTURAL MECHANICS

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

*Curri. Ref. No.: CE406*

**Total Contact hrs.:**          **Total marks: 100**          *Theory:*
*Theory: 45*                                                  *End Term Exam: 75*
*Tutorial: 15*                                                *P.A.: 25*

**Theory Class duration:**
*45 classes of 1hr. or*
*60 classes of 45 minutes*
**Pre requisite: CE205**
**Credit: 4**

**RATIONALE:**

Structural Mechanics deals with the internal behaviour of variously loaded solid bodies, such as bars, beams, shafts, plates, and columns, as well as structures and machines that are assemblies of these components. Mechanics of materials focuses primarily on mechanical properties of materials, analysis of stress, strain and evaluation of deformations. The subjects like structural analysis, design of structures as well as machines are based on adequate knowledge and understanding of structural mechanics. Therefore, it is an important basic subject for Diploma students in Civil Engineering.

**AIM :**

The aim of the subject Structural Mechanics is to develop background preparation of students for taking up Engineering subjects like Theory and Design of Structures mostly through the followings:

- Describe the Mechanical properties of important Engineering materials
- Determine stresses, strains and deformations in elastic bodies of different shapes under different loading conditions for engineering applications.
- Determine load carrying capacity of different types of members.

**THEORY :** 45 Hours

| Unit | Topic/Sub-Topic | Hrs. | Total hrs. |
|------|-----------------|------|------------|
| 1.0 | SIMPLE STRESSES AND STRAINS | 3 | |
| | 1.1    Elastic constant and relationship | | |
| | 1.2    Temperature stresses | | |
| | 1.3    Composite section | | |
| 2.0 | SHEAR FORCE AND BENDING MOMENT | 12 | |
| | 2.1    Types of beams | | |
| | 2.2    Sign convention | | |
| | 2.3    Shear force and bending moment diagram for | | |
| |      •   Cantilever beam | | |
| |      •   Simply supported beam | | |

- Overhanging beam

| | | |
|---|---|---|
| 3.0 | BENDING STRESSES IN BEAMS | 6 |
| 3.1 | Theory of simple bending | |
| 3.2 | Section modulus for various sections | |
| 3.3 | Flitched beams | |
| 3.4 | Shear stresses in beams | |
| 4.0 | COLUMN AND STRUT | 4 |
| 4.1 | Long column and short column | |
| 4.2 | Euler's formula | |
| 4.3 | Rankine's formula | |
| 5.0 | DEFLECTION OF BEAMS | 4 |
| 5.1 | Slope and deflection equation for | |

- Cantilever beam

- Simply supported beam ( with point and UDL only)

| | | |
|---|---|---|
| 6.0 | PLANE TRUSSES | 6 |
| 6.1 | Determinate trusses | |
| 6.2 | Method of joints | |
| 6.3 | Methods of sections | |
| 7.0 | TORSION | 7 |
| 7.1 | Basic assumptions for pure torsion, torsion of circular shafts (hollow and solid, no proof) – polar moment of inertia, torsional shearing stress, angle of twist, torsional rigidity. | |
| 8.0 | FORMATIVE EVALUATION | 3 |
| | **TOTAL:** | **45** |

**REFERENCE BOOKS :**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Elements of Strength of Material | S. P. Timoshenko & D. H. Young | EWP Pvt. Ltd. |
| 2. | Engineering Mechanics of Solids | E. P. Popov | Pearson Education |
| 3. | Strength of Materials | R. Subramanian | Oxford University Press |
| 4. | Strength of Materials | S. S. Bhavikatti | Vikas Publishing House Pvt. Ltd. |
| 5. | Strength of Material | A. Pytel & F.L. Singer | AWL Inc. |
| 6. | Fundamentals of Strength of Material | Nag & Chandra | WIE |
| 7. | Problems & Solutions in Strength of Material | S. C. Singhal | CBS Publishers |
| 8. | Strength of Materials | Dutta, A. K. | New Age International (P) Ltd. |
| 9. | A Text Book of Strength of Material | UC Jindal | Asian Books Pvt. Ltd. |
| 10. | Statics and Strength of Material | UC Jindal | Asian Books Pvt. Ltd. |
| 11. | Strength of Materials (Theory and Problems) | R. Subramanian | Oxford University Press |
| 12. | Fundamentals of Strength of Materials | P. Chandramouli | PHI Learning |

# GEO-TECHNICAL ENGINEERING – I

| L | T | P | | *Curri. Ref. No.: CE407* |
|---|---|---|---|---|
| 3 | 1 | 2 | | |

**Total Contact hrs.:**      **Total marks: 150**      **Theory:**
*Theory: 45*                                             *End Term Exam: 75*
*Tutorial: 15*                                             *P.A.: 25*
*Practical: 30*                                         **Practical:**
**Theory Class duration:**                           *End Term Exam: 25*
*45 classes of 1hr. or*                                 *I.A : 25*
*60 classes of 45 minutes*
**Pre requisite: None**
**Credit: 5**

## RATIONALE:

The knowledge and skills of Geo-Technical Engineering is important as any other subject of Civil Engineering. Practical works in Geo-Technical Engineering are equally important. The theory together with practices of this subject will definitely help the Practicing Civil Engineers in Civil Engineering construction works, specially in the design and construction of building foundation and other structures.

## AIM:

To develop fundamental concept of Geo-technical Engineering, particularly knowledge and skills of (a) Classification of soils and soil structure (b) Soil mass and fundamental concepts and principles (c) Permeability, seepage, compaction, consolidation and shear strength of soils.

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|------|-----------------|------|------------|
| 1.0 | INTRODUCTION | 2 | |
| | 1.1   Definition of soil, formation of soil, residual and transported soil | | |
| 2.0 | INDEX PROPERTIES | 7 | |
| | 2.1   Preliminary definition of water content, density, specific gravity, void ratio, degree of saturation, density index, numerical problems | | |
| | 2.2   Determination of water content, specific gravity and particle size distribution. Numerical problems | | |
| | 2.3   Definition, relation and determination of liquid limit, plastic and shrinkage limit, Application of consistency limit. Numerical problems | | |
| 3.0 | CLASSIFICATION OF SOIL | 6 | |
| | 3.1   Identification and description of coarse and fine grained soils | | |

|      |     |                                                                                                      |     |
| ---- | --- | ---------------------------------------------------------------------------------------------------- | --- |
|      | 3.2 | Particle size classification , textual classification, HRB classification, unified soil classification , IS classification | |
| 4.0  |     | SOIL STRUCTURE                                                                                       | 2   |
|      | 4.1 | Particle arrangement in course grained, clay and composite soil                                     |     |
| 5.0  |     | PERMEABILITY                                                                                         | 4   |
|      | 5.1 | Definition of head, gradient                                                                        |     |
|      | 5.2 | Darcy's law, Validity of Darcy's law                                                                |     |
|      | 5.3 | Laboratory and field determination of permeability                                                  |     |
|      | 5.4 | Factors effecting permeability                                                                      |     |
| 6.0  |     | SEEPAGE ANALYSIS                                                                                    | 4   |
|      | 6.1 | Definition and concept of seepage flow and flow net                                                 |     |
| 7.0  |     | COMPACTION                                                                                          | 5   |
|      | 7.1 | Definition, maximum dry density, optimum moisture content                                           |     |
|      | 7.2 | Factors effecting compaction                                                                        |     |
|      | 7.3 | Light and heavy compaction test as per IS specification                                             |     |
|      | 7.4 | Field compaction methods                                                                            |     |
| 8.0  |     | CONSOLIDATION                                                                                       | 4   |
|      | 8.1 | Brief concept of compressibility and consolidation                                                  |     |
|      | 8.2 | One dimensional consolidation test                                                                  |     |
| 9.0  |     | SHEAR STRENGTH                                                                                      | 8   |
|      | 9.1 | Definition of shear and shear parameters                                                            |     |
|      | 9.2 | Mohr circle, unconfined compression test, direct shear test, UU test, numerical problems            |     |
|      | 9.3 | Introduction to triaxial tests                                                                      |     |
| 10.0 |     | FORMATIVE EVALUATION                                                                                | 3   |
|      |     | **TOTAL:**                                                                                         | **45** |

**REFERENCE BOOKS :**

| Sl. No. | Name of Book | Author | Publishers |
| --- | --- | --- | --- |
| 1. | Principles of Geotechnical Engineering | B. M. Das | Thomson |
| 2. | Basic and Applied Soil Mechanics | Gopal, Ranjan | New Age International (P) Ltd. |
| 3. | Soil Mechanics and Foundations, 2ed, w/CD | Budhu | Wiley India |
| 4. | Soil Mechanics SI Version | Lambe | Wiley India |
| 5. | Soil Mechanics & Foundation Engineering | Raj | Pearson |
| 6. | Soil Mechanics & Foundations | B. C. Punmia, Ashok Jain & Arun Jain | Laxmi Publication |
| 7. | Basic Soil Mechanics & Foundation | Alam Singh | CBS Publishers |
| 8. | Soil Mechanics & Foundation Engineering | VNS Murthy | CBS Publishers |

## GEO-TECHNICAL ENGINEERING LABORATORY

**List of Experiments / Tests**                                                    **30**

1. To determine the water content and specific gravity of a given soil sample.

2. To determine the field density of a soil using core-cutter and sand replacement method.

3. To determine the grain size distribution of a cohesionless soil sample by Mechanical Analysis.

4. To determine the grain size distribution of a fine grain soil sample by Hydrometer analysis.

5. To determine of the consistency limits of a given soil sample by using Casagrande's liquid limit device, cone penetrometer.

6. To determine the coefficient of permeability: Constant head and variable head method.

7. To determine the maximum dry density and optimum moisture content by light and heavy compaction.

8. Unconfined compression test, direct shear test

9. Demonstration Test in the Laboratory —  One dimensional consolidation test Triaxial test

# THEORY OF STRUCTURES

| L | T | P | | *Curri. Ref. No.: CE408* |
|---|---|---|---|---|
| 3 | 1 | 0 | | |

**Total Contact hrs.:**        **Total marks: 100**        *Theory:*
*Theory: 45*                                                      *End Term Exam: 75*
*Tutorial: 30*                                                   *P.A.: 25*
**Theory Class duration:**                                **Practical:**
*45 classes of 1hr. or*                                       *End Term Exam : Nil*
*60 classes of 45 minutes*                                *I.A : Nil*
**Pre requisite: 406**
**Credit: 4**

## RATIONALE :

Theory of structures is a very important subject for diploma holders in Civil Engineering. Many of them are entrusted with the responsibility to supervise constructions, make minor remedial changes in maintenance work, analyze simple structures etc. An adequate knowledge of behaviour of structures is very essential for developing self-confidence among the diploma engineers for delivering quality service of work. An understanding of 'why' part of structural behaviour and failures enables them to give adequate comparative weightage of their attention to different components of construction supervision jobs.

## AIM:

The course content of 'Theory of Structures' aims at knowledge, concepts, and understanding of principles and behaviour of Civil Engineering Structures with related assumptions but without going into much theoretical derivation.

| Unit | Topic/Sub-Topic | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | BENDING AND SHEAR STRESSES IN BEAMS: | 8 | |
| | 1.1  Loads, beams, shearing forces, and bending moment – Explain types of loads, shearing force and bending moment, distinguish between simply supported and cantilever beams. | | |
| | 1.2  Exercise -- Calculate shearing forces and bending moments and draw the diagrams. | | |
| | 1.3  Application to steel and timber beams -- Calculate bending stresses in steel & timber beams, evaluate moment of resistance, solve numerical problems by applying the equations of bending, draw distribution of bending stress. | | |
| | 1.4  Flitched beams – solve numerical problems on finding safe load of flitched beams, draw distribution of stresses, and find the moment of resistance given sections. | | |
| | 1.5  Shear stress in beams—calculate shear stresses at different layers of a given beam, draw the distribution of shear stress for different structural sections (only application of formula). | | |

**REFERENCE BOOKS :**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Strength of Material | Subrmaniam | Oxford |
| 2. | Basic Structural Analysis | C. S. Reddy | TMH |
| 3. | Intermediate Structural Analysis | C. K. Wang | McGraw Hill |
| 4. | Theory of Structure | S. Ramamrutham | |
| 5. | Structural Analysis | Thandavamurthy | Oxford |
| 6. | Structural Analysis | Bhavikatti | Vikas Publishing House |
| 7. | Indeterminate Structures | Jindal | S. Chand & Company |

# WATER & WASTE WATER ENGINEERING (Theory)

L     T     P                               **Curri. Ref. No.: CE409**
3     1     2

| **Total Contact hrs.:** | **Total marks: 150** | **Theory:** |
|---|---|---|
| *Theory: 45, Tutorial: 15* | | *End Term Exam: 75* |
| *Practical: 30* | | *P.A.: 25* |
| **Theory Class duration:** | | **Practical:** |
| *60 classes of 1hr. or* | | *End Term Exam: 25* |
| *80 classes of 45 minutes* | | *I.A: 25* |
| **Pre requisite: CE403** | | |
| **Credit: 5** | | |

## RATIONALE:

Providing potable water, one of the basic necessities of life, to a community is an important activity of a civil engineer. Knowledge and skill in the field of water supply engineering and waste water disposal is essential for maintaining the health and sanitation of a community.

## AIM:

The course content of Water Supply & Sanitary Engineering has been designed to provide adequate information to develop competency in a learner to-

1. Estimate the water requirements of a community
2. Select suitable source for a water supply project
3. Analyze the quality of water to determine its suitability for drinking
4. Identify the appropriate treatment processes required for making the water potable
5. Construct, operate and maintain the various units of water treatment plants
6. Lay out the necessary arrangement of pipe systems and structures for conveying water from the source to the treatment plant and for supply of treated water from the treatment plant to the consumer inside the building.
7. Estimate the volume of various types of sewage from a community
8. Layout the necessary sewerage system along with the appurtenances for collection and disposal of sewage
9. Analyze the sewage characteristics to determine the degree of treatment required for disposal according to government standards
10. Identify the appropriate treatment processes required to make the sewage fit for disposal
11. Construct, operate and maintain the various units of waste water treatment plants
12. Implement rural water supply and sanitation projects

## COURSE CONTENT:

### WATER SUPPLY ENGINEERING

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | INTRODUCTION | 01 | |
| | 1.1 History of protected water supply | | |
| | 1.2 Various considerations in the preparations of a water supply project | | |
| 2.0 | QUANTITY OF WATER | 02 | |
| | 2.1 Per capita demand | | |
| | 2.2 Design period of water supply project | | |
| | 2.3 Factors affecting various demands | | |
| | 2.4 Population forecast, problems | | |
| 3.0 | SOURCES AND COLLECTION OF WATER | 06 | |
| | 3.1 Surface sources | | |
| | 3.2 Ground water | | |
| | 3.3 Intake works | | |
| | 3.4 Wells: Types and description | | |
| | 3.5 Flow equation (no deduction), numerical problem | | |
| 4.0 | QUALITY OF WATER | 04 | |
| | 4.1 Impurities in water: physical, chemical and bacteriogical | | |
| | 4.2 Drinking water standards | | |
| | 4.3 Detection of impurities | | |
| | 4.4 $p^H$-value, Turbidity | | |
| 5.0 | TREATMENT OF WATER | 08 | |
| | 5.1 Sedimentation | | |
| | 5.2 Sedimentation with Coagulation | | |
| | 5.3 Filtration ( Slow sand and rapid sand filter, pressure filter) | | |
| | 5.4 Disinfections of water, breakpoint, Chlorination | | |
| | 5.5 Miscellaneous methods: Aeration, Iron, and Manganese removal | | |
| | 5.6 Water softening process | | |
| | 5.7 Layout of water treatment plant | | |

### WASTE WATER ENGINEERING

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| 6.0 | INTRODUCTION: | 01 | |
| | 6.1 Purpose and principles of sanitation. | | |
| | 6.2 Conservancy system and water carriage system | | |
| | 6.3 Classification of Sewerage systems: Combined, separate and partially separate system | | |
| 7.0 | QUANTITY OF SEWAGE & DESIGN OF SEWERS: | 04 | |
| | 7.1 Flow- types and variation | | |
| | 7.2 Shape and size of sewers, gradient, velocities and principles of design, problems | | |
| 8.0 | SEWER APPURTENANCES: | 02 | |
| | 8.1 Man holes and lamp holes | | |
| | 8.2 Inlet grease and oil traps | | |

8.3     Storm regulators and inverted siphons

8.4     Lifting of sewage necessity and plumbing

9.0     CHARACTERISTICS OF SEWAGE:            03

      9.1     Physical and biological

      9.2     Decomposition of sewage

      9.3     B.O.D. test, problems

10.0     SEWAGE DISPOSAL            02

      10.1     Dilution method, specification for disposal

      10.2     Self purification of river, D.O sag curve (only description)

11.0     SEWAGE TREATMENT METHOD:            04

      11.1     Flow diagram of a conventional sewage treatment plant

      11.2     Tricking filters — Sketch and description only

      11.3     Activated sludge process — Sketch and description only

      11.4     Oxidation ponds and Oxidation ditch — Sketch and description only

12.0     SLUDGE DISPOSAL            03

      12.1     Sludge digration tanks and Sludge drying beds

      12.2     Septic tank — description and design

13.0     WATER SUPPLY AND DRAINAGE IN BUILDINGS        02

      13.1     Storage Tanks

      13.2     Principles of Design of water supply in buildings

      13.3     Traps

      13.4     Sanitary Fittings

      13.5     Systems of Drainage

14.0     FORMATIVE EVALUATION            03

**TOTAL:       45**

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Water Supply and Sanitary Engineering | S.C. Rangwala | Charotar Publishing House |
| 2. | Water Supply Engineering Volume - 1 | P. N. Modi | Standard Book House |
| 3. | Waste Water Treatment and Sewage Disposal | M.N. Moulik | Standard Book House |
| 4. | Sewage Treatment & Disposal And Water Supply Engineering | P. N. Modi | Standard Book House |
| 5. | Water Supply Engineering | B. C. Punmia, Ashok Jain & Arun Jain | Laxmi Publication |
| 6. | Waste Water Engineering | B. C. Punmia, Ashok Jain & Arun Jain | Laxmi Publication |
| 7. | CPHEEO Manual-Water Supply | | Ministry of Urban; Development, Govt. of India |
| 8. | CPHEEO Manual-Sewage | | Ministry of Urban Sewage Treatment Development, Govt. of India |

# WATER & WASTE WATER ENGINEERING (Practical)

**RATIONALE:**

Laboratory practice is an essential component for study of the subject water supply & sanitary engineering. Data obtained from tests conducted in the laboratory are the basis of decision-making process adopted in the field. The course work includes the tests for determination of essential parameters for assessing the quality of water and characteristics of waste water.

**AIM:**

The course content of water supply & sanitary engineering practical has been designed to provide adequate hands-on-experience to develop the competency in a learner to -

1. Assess the suitability of a water sample for drinking water use
2. Determine the chemical dosage requirements in various stages of water treatment process
3. Assess the characteristics of a waste water sample.

**COURSE CONTENT:**

The students will perform the following tests/exercises to determine different parameters of given samples of water and waste water.

| Unit | Topic/Sub-Topic | Hrs. | Total hrs. |
|------|-----------------|------|------------|
| 1.0 | Collection and Sampling of sewage and wastewater | | |
| 2.0 | Determination of Alkalinity of water sample | | |
| 3.0 | Determination of pH value of water and sewage sample | | |
| 4.0 | Determination of turbidity of a water sample | | |
| 5.0 | Determination of iron in water sample | | |
| 6.0 | Determination of optimum value of coagulant dose (Jar test) | | |
| 7.0 | Determination of solids in sewage sample | | |
| 8.0 | Determination of sludge volume index (SVI) | | |
| 9.0 | Determination of Bio-chemical Oxygen Demand (BOD) of a waste water sample | | |
| | **TOTAL:** | | **30** |

# BUILDING CONSTRUCTION

*L T P*                               ***Curri. Ref. No.: CE410***
*3 1 0*

**Total Contact hrs.:**      **Total marks: 100**      **Theory:**
*Theory: 45*                                        *End Term Exam: 75*
*Tutorial: 15*                                           *P.A.: 25*
**Theory Class duration:**
*60 classes of 1hr. or*
*90 classes of 45 minutes*
**Pre requisite: Nil**
**Credit: 4**


## RATIONALE:

Many diploma holders in Civil Engineering are expected to supervise construction of buildings and other structures. To perform the above task, it is essential that students should have knowledge of various components of buildings like foundations, walls, roofs, staircases, floors etc., and their constructional details. Therefore, the subject of building construction is very important for Civil Engineering diploma holders.

## AIM:

The aim of the subject of building construction is mostly to impart knowledge of different components of a building and their construction details to the diploma students of Civil Engineering.

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|------|-----------------|------|------------|
| 1.0 | INTRODUCTION | 2 | |
| | 1.1   Classification of building based on occupancy | | |
| | 1.2   Different parts of building and their requirements | | |
| 2.0 | SITE INVESTICATION | 3 | |
| | 2.1   Object of site investigation ( exploration) | | |
| | 2.2   Method of site investigation. Brief description of site reconnaissance (Inspection of site), boring methods, sampling, samplers | | |
| 3.0 | FOUNDATIONS | 6 | |
| | 3.1   Definitions and purpose of foundation | | |
| | 3.2   Essential requirements of foundations | | |
| | 3.3   Type of foundation: Shallow and deep foundations and their classifications | | |
| | 3.4   Shallow foundation: constructional and details of spread foundations for walls, isolated footing, combined footings, raft foundation ( with sketches) | | |
| | 3.5   Deep foundations-pile foundation-types, classification and their relative merits and demerits, pier or well foundations. | | |
| 4.0 | BRICK MASONRY | 5 | |
| | 4.1   Definition: Materials used in brick masonry, general principles to be observed in brick masonry | | |

| | | |
|---|---|---|
| | 4.2 Types of bonds, details with sketches | |
| | 4.3 Brick masonry construction | |
| 5.0 | STONE MASONRY | 3 |
| | 5.1 Uses, comparison between stone masonry and brick masonry | |
| | 5.2 Materials used in stone masonry | |
| | 5.3 Technical terms used in stone masonry | |
| | 5.4 Types of stone masonry-Rubble masonry and ashlars masonry, their description with classification | |
| 6.0 | PARTITION WALLS & CAVITY WALLS | 2 |
| | 6.1 Definition of partition and cavity wall | |
| | 6.2 Advantage of cavity wall | |
| | 6.3 Types of partition walls-Brief description of brick partitions, concrete partitions only | |
| 7.0 | ARCHES AND LINTELS | 2 |
| | 7.1 Meaning and use of arches and lintels | |
| | 7.2 Technical terms in arches and lintel | |
| | 7.3 Classification of lintels | |
| 8.0 | DOORS AND WINDOWS | 3 |
| | 8.1 Glossary of terms used in doors and windows | |
| | 8.2 Door-use, types of doors(description with sketches) | |
| | 8.3 Window-use, types of windows (shallow foundations) | |
| 9.0 | DAMP PROOFING | 2 |
| | 9.1 Definition of dampness, defects of dampness, causes of Dampness | |
| | 9.2 Sources of dampness, prevention of dampness | |
| | 9.3 Materials used for damp proofing | |
| 10.0 | FLOORS | 4 |
| | 10.1 Ground floor, types of flooring, concrete flooring Mosaic flooring, terrazzo flooring, marble flooring | |
| | 10.2 Selection of a suitable type of floor material | |
| 11.0 | STAIRS | 4 |
| | 11.1 Definition, location of stairs | |
| | 11.2 Common technical terms used in stairs construction | |
| | 11.3 Requirements of good stairs | |
| | 11.4 Classification of stairs ( brief description with diagram) | |
| 12.0 | ROOFS | 2 |
| | 12.1 Types of roofs, description of sloping roofs, flat roofs | |
| | 12.2 King post and Queen post truss | |
| 13.0 | SURFACE FINISH | 2 |
| | 13.1 Plastering –definition, materials used for plastering, application of plaster, defects in Plastering | |
| | 13.2 Pointing-definition, types of pointing, preparation of surface Mortar used | |
| 14.0 | CONSTRUCTION BY TIMBER & BAMBOO | 2 |
| | 14.1 Brief study on available raw materials | |
| | 14.2 Study on different types construction by using locally available materials (specially timber and bamboo) | |
| 15.0 | FORMATIVE EVALUATION | 3 |
| | **TOTAL:** | **45** |

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Building Construction | Varghese | PHI Learning |
| 2. | Building Construction | B. C. Punmia, Ashok Jain & Arun Jain | Laxmi Publication |
| 3. | Building Construction Details Practical Drawing | Hans Banz | CBS Publishers |
| 4. | Building Construction Drafting & Design | John Molnar, P. E. | CBS Publishers |
| 5. | Civil Engineering Building Construction Handbook | Ahuja & Virdhi | Standard Book House |
| 6. | Building Construction And Materials | Gurcharan Singh | Standard Book House |
| 7. | Building Construction And Materials | Gurcharan Singh | Standard Book House |

# APPLIED TECHNOLOGY COURSES

# HIGHWAY & TRANSPORTATION ENGINEERING

| L | T | P | | *Curri. Ref. No.: CE501* |
|---|---|---|---|---|
| *3* | *1* | *2* | | |

| **Total Contact hrs.:** | **Total marks: 150** | **Theory:** |
|---|---|---|
| *Theory: 45* | | *End Term Exam: 75* |
| *Tutorial: 15* | | *P.A.: 25* |
| *Practical: 30* | | **Practical:** |
| **Theory Class duration:** | | *End Term Exam: 25* |
| *60 classes of 1hr. or* | | *I.A: 25* |
| *90 classes of 45 minutes* | | |

**Pre requisite: CE 407**
**Credit: 5**

## RATIONALE:

The subject of highway and transportation engineering is very important as it deals essentially with road transportation. It is essential for the students to get a through input into the different components of road constructions, maintenance, drainage and related traffic engineering.

## AIM:

To develop knowledge and skill in highway development, highway plans and administration, highway economics and financing, traffic engineering, bituminous materials, bituminous surface treatment, carpet coat, road-mix and intermediate type bituminous plant mix surfaces, high type bituminous pavement and their construction.

| Unit | Topic/Sub-Topic | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | INTRODUCTION | 6 | |
| | 1.1 Introduction Transportation Engineering, different types of transportation their components and relative assessment | | |
| | 1.2 Introduction to Highways, classification of highway in India, road development plans, roles of IRC, CRRI, BRO etc. | | |
| 2.0 | PLANNING OF HIGHWAYS | 4 | |
| | 2.1 Road alignment, formation, longitudinal and cross sectional components of different highways | | |
| | 2.2 Preparation of reports including maps, land acquisition etc. | | |
| 4.0 | GEOMETRIC DESIGN OF HIGHWAYS | 10 | |
| | 4.1 Vehicular characteristics, camber, sight distance, horizontal alignment (super-elevation, widening, transition at curves), gradient and vertical curve, numerical problems | | |
| 5.0 | HIGHWAY DRAINAGE | 2 | |
| | 5.1 Surface drainage, numerical problem | | |
| | 5.2 Sub-surface drainage, types and characteristics | | |
| 6.0 | TYPES OF PAVEMENTS | 2 | |
| | 6.1 Flexible and rigid pavements, definition characteristics and differences | | |
| 7.0 | PAVEMENT MATERIALS & CONSTRUCTION | 6 | |
| | 7.1 Different types of aggregate material and testing | | |

|      |                                                                                      | Hrs. | Total hrs. |
|------|--------------------------------------------------------------------------------------|------|------------|
|      | 7.2   Bitumen – types, testing and bituminous mix                                    |      |            |
|      | 7.3   Different construction methods: Earth and gravel road, WBM, bituminous pavements and concrete pavements |      |            |
|      | 7.4   California bearing ratio (CBR) test                                             |      |            |
| 8.0  | INTRODUCTION TO TRAFFIC ENGINEERING                                                  | 2    |            |
|      | 8.1   Definition, road signs and signals                                             |      |            |
| 9.0  | BRIDGE                                                                                | 10   |            |
|      | 9.1   Introduction to bridge engineering                                             |      |            |
|      | 9.2   Classification of bridge                                                        |      |            |
|      | 9.3   Types of loading of road bridges as per IRC recommendation                     |      |            |
|      | 9.4   Bridge foundations and bearings                                                |      |            |
|      | 9.5   Bridge protection works                                                        |      |            |
| 10.0 | FORMATIVE EVALUATION                                                                  | 3    |            |
|      | **TOTAL:**                                                                           |      | **45**     |


## TRANSPORTATION ENGINEERING LABORATORY

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|------|-----------------|------|------------|
| 1.0  | AGGREGATES |  |  |
|      | 1.1   Determination of crushing value of given road aggregate |  |  |
|      | 1.2   Determination of aggregate impact value |  |  |
|      | 1.3   Determination of Los Angels Abrasion value |  |  |
|      | 1.4   Determination of Flakiness index and Elongation Index |  |  |
|      | 1.5   Specific gravity of aggregate |  |  |
|      | 1.6   CBR (California Bearing Ratio) Test |  |  |
| 2.0  | BITUMEN |  |  |
|      | 2.1   Penetration value of Bitumen |  |  |
|      | 2.2   Viscosity value of Bitumen |  |  |
|      | 2.3   Ductility value of Bitumen |  |  |
|      | 2.4   Flash Point and fire point of Bitumen |  |  |
|      | 2.5   Softening point of Bitumen |  |  |
| 3.0  | Marshal stability test for bituminous mix design |  |  |
|      | **TOTAL:** |  | **30** |

**REFERENCE BOOK:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Highway Engineering | Khanna & Justo | Nemchand Brothers |
| 2. | Transportation Engineering — An Introduction, 3rd ed. | Khisty & Lall | PHI Learning |
| 3. | Principles of Transportation Engineering | Chakroborty & Das | PHI Learning |
| 4. | Transportation Engineering and Planning, 3rd ed. | Papacostas & Prevedouros | PHI Learning |
| 5. | Highway Engineering | S.C. Rangwala | Charotar Publishing House |
| 6. | Highway Engineering | T. D. Ahuja | Standard Book House |
| 7. | Laboratory Manual in Highway Engineering | Duggal, Ajay K. | New Age International (P) Ltd. |
| 8. | Principle of Traffic and Highway Engineering | G. Nicholas J. | Cengage |

# GEO-TECHNICAL ENGINEERING – II

| | | | |
|---|---|---|---|
| *L* | *T* | *P* | ***Curri. Ref. No.: CE502*** |
| *3* | *1* | *0* | |

**Total Contact hrs.:**      **Total marks: 100**      ***Theory:***
*Theory: 45*                                                 *End Term Exam: 75*
*Tutorial: 15*                                                  *P.A.: 25*
**Theory Class duration:**
*45 classes of 1hr. or*
*60 classes of 45 minutes*
**Pre requisite: C407**
**Credit: 4**

## RATIONALE:

The knowledge and skills of Geo-Technical Engineering is very important subject of Civil Engineering. Practical works in Geo-Technical Engineering are equally important. The theory together with practices of this subject will definitely help the Practicing Civil Engineers in Civil Engineering Construction Works, specially in the design and construction of building foundation.

## AIM:

Geo-technical Engineering II aims at imparting basic knowledge on Earth Pressure Theories, slope stability, soil exploration, bearing capacity and settlement analysis of shallow foundations, deep foundations and introduction to soil improvement and stabilization techniques.

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | EARTH PRESSURE THEORIES | 8 | |
| 1.1 | Rankine & Colomb's Earth Pressure theories | | |
| 1.2 | Determination of Earth Pressure on retaining wall by applying Rankine's Theory, simple problems | | |
| 1.3 | Statbility of retaining walls: Fundamental consideration (no derivation) | | |
| 2.0 | STABILITY OF SLOPES | 4 | |
| 2.1 | Introduction, definition and types of slope | | |
| 2.2 | Slope protection measures | | |
| 3.0 | SHALLOW FOUNDATIONS | 12 | |
| 3.1 | Types and definition | | |
| 3.2 | Bearing capacity analysis of isolated shallow foundation by Terzaghi's and IS code method (IS 6403-1981) | | |
| 3.3 | Settlement: Immediate and consolidation settlement, estimation of immediate and consolidation settlement of isolated footings (IS 8009-part I), simple problems | | |
| 4.0 | SOIL EXPLORATION & SITE INVESTIGATION | 6 | |

**REFERENCE BOOKS :**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Principles of Foundation Engineering | B. M. Das | Thomson |
| 2. | Soil Mechanics and Foundations, 2ed, w/CD | Budhu | Wiley India |
| 3. | Soil Mechanics SI Version | Lambe | Wiley India |
| 4. | Soil Mechanics & Foundation Engineering | Raj | Pearson |
| 5. | Soil Mechanics & Foundations | B. C. Punmia, Ashok Jain & Arun Jain | Laxmi Publication |
| 6. | Basic Soil Mechanics & Foundation | Alam Singh | CBS Publishers |
| 7. | Soil Mechanics & Foundation Engineering | VNS Murthy | CBS Publishers |
| 8. | Relevant IS Codes: IS 6403, IS 8009, IS 1892, IS 2911 | | Bureau of Indian Standards |

# WATER RESOURCE ENGINEERING

*L        T        P*                                              ***Curri. Ref. No.: CE503***
*3        1        0*

**Total Contact hrs.:**                **Total marks: 100**        **Theory:**
*Theory: 45*                                                      *End Term Exam: 75*
*Tutorial: 15*                                                    *P.A.: 25*
**Theory Class duration:**
*45 classes of 1hr. or*
*60 classes of 45 minutes*
**Pre requisite: CE402**
**Credit: 4**

## RATIONALE:

Many diploma holders in civil engineering supervise the construction or perform the maintenance of canals, head-works, river training works, cross drainage works, regulatory and other works. Some of diploma holders are also engaged for preventing water logging and irrigation by tube-wells.

## Aim:

This subject Water Resource Engineering aims imparting knowledge regarding hydrology, flow irrigation - storage and distribution system, constructional features of head works, river training works, cross drainage works, causes and prevention of water logging and construction of tube-wells.

| UNIT | TOPIC/SUB-TOPIC | | Hrs. | Total hrs. |
|------|-----------------|---|------|-----------|
| 1.0 | INTRODUCTION: | | 2 | |
| | 1.1 | Definition of irrigation, necessity of irrigation, advantages of irrigation, types of irrigation-brief description of each type | | |
| 2.0 | CONSUMPTIVE USE OF WATER | | 3 | |
| | 2.1 | Water requirements of crops-delta, duty and base period-their relationship and associated problems | | |
| | 2.2 | Definition of common terms: Kor depth, Kor period, crop ratio, outlet factor capacity factor, cumec day. GGA, CCA, intensity of irrigation, root-zone-depth, crop rotation | | |
| 3.0 | HYDROLOGY | | 8 | |
| | 3.1 | Importance of hydrological cycle, measurement of precipitation by rain-gauges, automatic and non automatic gauges, types of precipitation, computation of average rainfall over a basin | | |
| | 3.2 | Runoff, factors affecting runoff, characteristics of catchments area, rainfall and runoff relationship | | |
| | 3.3 | Measurement of river discharge with current meter. Computation of maximum flood discharge from flood mark, Ryves and Dicken's formulae, Hydrographs | | |
| 4.0 | GROUND WATER | | 3 | |

|       |                                                                                                                  |     |
|-------|------------------------------------------------------------------------------------------------------------------|-----|
| 4.1   | Shallow wells, deep wells, construction method of tube well and yield from wells                                 |     |
| 4.2   | Centrifugal and air lift pumps for lifting water                                                                 |     |
| 5.0   | **WEIRS**                                                                                                        | 4   |
| 5.1   | Component parts of a diversion head works and their functions, selection of site of a head work                 |     |
| 5.2   | Weir section showing its different components and function of barrage                                            |     |
| 6.0   | **DAMS**                                                                                                         | 7   |
| 6.1   | Selection of site of a gravity dam, sketch of a gravity dam, showing sluice gates, galleries cut-off etc.        |     |
| 6.2   | Method of construction of earth dams, sketch of an earthen dam showing stone pitching, rock toe, core wall, under drainages etc, section of a pipe outlet |     |
| 6.3   | Failures of earth dams, protection against failures                                                              |     |
| 7.0   | **CANAL & APPURTENANCES**                                                                                        | 6   |
| 7.1   | Canals-classification of canal, contour canal, ridge canal and watershed canals                                 |     |
| 7.2   | Purpose of canal lining , types of linings                                                                       |     |
| 7.3   | Cross-drainage works, definition and different methods of cross-drainage works with sketches                    |     |
| 8.0   | **WATER LOGGING**                                                                                               | 2   |
| 8.1   | Water logging –definition of the term, its ill effects and reclaimation of water logged areas                    |     |
| 9.0   | **RIVER TRAINING WORKS**                                                                                        | 3   |
| 9.1   | Necessity of river training, type of river training works, functions of guide banks, marginal embankment cutt-off, spurs and groynes. Sketches of guide banks, spurs and groynes |     |
| 10.0  | **SMALL HYDROPOWER PROJECTS**                                                                                   | 4   |
| 10.1  | Feasibility study and site selection                                                                             |     |
| 10.2  | Components, typical flow diagram                                                                                  |     |
| 11.0  | **FORMATIVE EVALUATION**                                                                                         | 3   |
|       | **TOTAL**                                                                                                        | **45** |

**REFERENCES:**

| Sl. No. | Name of Book | Author | Publishers |
|---------|--------------|--------|------------|
| 1. | Irrigation Water Resources And Water Power Engineering | P. N. Modi | Standard Book House |
| 2. | Irrigation & Water Power Engineering | B. C. Punmia, Pande, B. B, Ashok Jain & Arun Jain | Laxmi Publication |
| 3. | Irrigation Engineering | N. Bask | TMH |
| 4. | Principles and Practice of Irrigation Engineering | Sharma | PHI |
| 5. | Irrigation and Hydraulic Structures | S. K. Garg | Khanna Publishers |
| 6. | Irrigation and Water Power Engineering | Das & Saikia | PHI Learning |
| 7. | Irrigation and Water Power Engineering | Das & Saikia | PHI Learning |
| 8. | | | |

# ESTIMATING - I

| L | T | P | | | **Curri. Ref. No.: CE504** |
|---|---|---|---|---|---|
| 2 | 2 | 0 | | | |

**Total Contact hrs.:**       **Total marks: 100**      **Theory:**
*Theory: 30*                                            *End Term Exam: 75*
*Tutorial: 30*                                            *P.A.: 25*
**Theory Class duration:**
*30 classes of 1hr. or*
*40 classes of 45 minutes*
**Pre requisite: Nil**
**Credit: 4**

## RATIONALE:

The subject of estimating is very important for the diploma holders in Civil Engineering. In order to construct any item, pertaining to Civil Engineering, one should have a knowledge of resource required for the works as also the money required for completion of the job.

## AIM:

To identify the schedule of works and make a correct estimate.

THEORY:

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | INTRODUCTION | 3 | |
| | 1.1   What is estimating? Purpose of estimating | | |
| | 1.2   Unit of measurement and rate of payment | | |
| 2.0 | TYPES OF ESTIMATES | 3 | |
| | 2.1   Plinth area estimate, carpet area estimate, cube rate estimate, revised estimate, supplementary estimate ,repair estimate | | |
| | 2.2   Bill of quantities, building cost index | | |
| 3.0 | EARTH WORK | 2 | |
| | 3.1   Method of calculating quantity of earth, mid-sectional area method, prismodal formula method, lead and lift , tabular forms for each mode of calculating earth-work quantity | | |
| 4.0 | MASONRY WORK | 3 | |
| | 4.1   Unit of measurement and method of estimating brick masonry works and R.B. works | | |
| 5.0 | CONCRETE WORK | 2 | |
| | 5.1   Unit of measurement and method of estimating mass concrete works, shuttering works in RCC slab, RCC column and foundation | | |
| 6.0 | FLOORING | 2 | |
| | 6.1   Unit of measurement, method of estimating floor, floor finishing and DPC | | |
| 7.0 | FINISHING AND DECORATING | 2 | |

|     |     |     |
| --- | --- | --- |
| 7.1 | Unit of measurement and method of estimating plastering and pointing | |
| 7.2 | Method of estimating of white washing, colour washing and painting | |
| **8.0** | **SANITARY AND PLUMBING** | **3** |
| 8.1 | Unit of measurement and method of estimating sanitary fittings and plumbing work in residential buildings | |
| 8.2 | Estimate of septic tank | |
| **9.0** | **STEEL WORK** | **7** |
| 9.1 | Unit of measurement and method of estimating of simple steel structure | |
| **10.0** | **FORMATIVE EVALUATION** | **3** |
| **11.0** | **TUTORIAL** | **30** |
| 11.1 | To estimate the volume of earthwork required for excavation and filling of the trench for road construction | |
| 11.2 | To prepare an estimate for sanitary & plumbing as required in a building. | |
| 11.3 | To prepare an estimate for timber works for a roof trussed building. | |
| 11.4 | To prepare an estimate for flooring items including finishing and decorating works | |
| 11.5 | To prepare an estimate of a double storied R.C. building | |
| | **TOTAL:** | **60** |

NOTE: - The above exercises will be given to the students as specified guided project work. They will be supplied with necessary drawings and data. These exercises should preferably be run parallel with the theoretical instruction.

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
| --- | --- | --- | --- |
| 1. | Estimating and Costing in Civil Engineering: Theory & Practice | B.N. Dutta | Sangam Books |
| 2. | Civil Engineering Estimating & Costing | Vazirani & Chandola | Khanna Publishers |
| 3. | Estimating, Costing and Specification | M. Chakraborty | |
| 4. | Estimation Costing & Valuation | S. C. Rangwala | Charotar Publishing House Pvt. Ltd |
| 5. | Estimating for Civil Engineers | D. V. Varshney | CBS Publishers |

# ESTIMATING - II

| L | T | P | |
|---|---|---|---|
| 2 | 2 | 0 | |

*Curri. Ref. No.: CE505*

**Total Contact hrs.:**      **Total marks: 100**      *Theory:*
*Theory: 30*                                                  *End Term Exam: 75*
*Tutorial: 30*                                                    *P.A.: 25*
**Theory Class duration:**
*15 classes of 1hr. or*
*20 classes of 45 minutes*
**Pre requisite: C504**
**Credit: 4**

## RATIONALE:

The subject of estimating is very important, as the students are required to know the various aspects of rate analysis, types of estimates, details of specifications for arriving at a correct estimate of a construction unit.

## AIM:

The aim of the subject is to acquaint the students with the methods of estimating and to explain the reason behind.

THEORY

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | ROAD WORKS | | 02 |
| | 1.1   Unit of measurement and method of estimating various items of work | | |
| 2.0 | RATE ANALYSIS | | 06 |
| | 1.1   Analysis of rates of brick work, plain cement concrete, RCC work, doors and windows, plastering, cement concrete floor, white washing, centering and shuttering, damp proof course coverage, carriage of materials, earth work for foundation and for cutting and filling of trenches | | |
| 3.0 | GENERAL AND DETAILED SPECIFICATION | | 04 |
| | 2.1   Specification of earthwork in excavation first class brick work, wood work, work in doors and windows, CGI sheet and AC sheet roofing, construction of road and pavement material, construction of cement concrete floor, plastering, white washing, plain concrete , RCC, cement mortar, mosaic floor, lime concrete in roof terracing, centering shuttering | | |
| 4.0 | INTRODUCTION TO DEPARTMENTAL EXECUTION OF WORK | | 07 |
| | 4.1   Contracts, contract agreement, item rate contract, lump sum contract, labour contract | | |
| | 4.2   Explanation of various terms — Administrative approval, | | |

technical sanction, contingencies, budget, tender, earnest
money, security deposit, running bill, final bill
- 4.3 Measurement Book: Use, procedure of making entries of measurement of works, supply of material, labour employed
- 4.4 Master Roll
- 5.0 EXERCISES                                                                                   08
  - 5.1 To estimate volume of earthwork required for excavation and filing of trench for road construction
  - 5.2 Irrigation canal:- partly cutting and partly banking
  - 5.3 To prepare a detailed estimate of a double storied RCC framed building with verandah, latrine, septic tank, fencing wall with decorative finish (including plumbing sanitary, steel and timber works.)
- 6.0 FORMATIVE EVALUATION                                                     3

|  | **TOTAL:** | **30** |

- 7.0 **TUTORIAL**                                                                              **30**
  - 7.1 To prepare a detailed estimate of an irrigation canal partly cutting and partly banking
  - 7.2 To prepare a detailed estimate of a double storied RCC framed building with verandah, latrines, septic tank, fencing wall with decorative finish (including plumbing, sanitary, steel and timber works)
  - 7.3 To prepare a detailed estimate of finishing items such as plastering, painting, varnishing etc.
  - 7.4 To prepare a supplementary estimate of a RC building for addition, alteration or deviation from the original plan of the building after part execution
  - 7.5 To prepare an estimate for annual repair of a RCC building
  - 7.6 To prepare an estimate for RC box culvert.

|  | **TOTAL** | **60** |

Note: The above exercise will be given to the students as specific guided project work. They will be supplied with necessary drawing details. These exercises should be preferably run in parallel with the theoretical instruction

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---------|--------------|--------|------------|
| 1. | Estimating and Costing in Civil Engineering: Theory & Practice | B.N. Dutta | Sangam Books |
| 2. | Civil Engineering Estimating & Costing | Vazirani & Chandola | Khanna Publishers |
| 3. | Estimating, Costing and Specification | M. Chakraborty | |
| 4. | Estimation Costing & Valuation | S. C. Rangwala | Charotar Publishing House Pvt. Ltd |
| 5. | Estimating for Civil Engineers | D. V. Varshney | CBS Publishers |

# SURVEYING – II

| L | T | P | | **Curri. Ref. No.: CE506** |
|---|---|---|---|---|
| *3* | *1* | *2* | | |

**Total Contact hrs.:**        **Total marks: 150**        **Theory:**
*Theory: 45*                                                     *End Term Exam: 75*
*Tutorial: 15*                                                     *P.A.: 25*
*Practical: 30*                                                  **Practical:**
**Theory Class duration:**                           *End Term Exam: 25*
*45 classes of 1hr. or*                                             *I.A: 25*
*60 classes of 45 minutes*
**Pre requisite: C405**
**Credit: 5**

## RATIONALE:

Surveying- II is the sequential course following Surveying-I. It covers the technique of handling and use of theodolite, a versatile instrument, in surveying for horizontal and vertical angular measurement, traversing, horizontal linear measurement, setting out curves and layout of different types of structures in the site. The course also gives an exposure to the students about the modern surveying instruments (Total Station). The theory course is supplemented with practical course in Surveying Practice-II.

## AIM:

The course content of Surveying -II has been designed to provide adequate information to develop competency in a learner to- comprehend the concepts of plane table surveying,

1. Prepare survey map by conducting traverse survey with theodolite
2. Measure height of objects with the help of theodolite
3. Determine horizontal distance by tacheometry
4. Set out circular curve in the field
5. Lay out the construction plan of different types of structures at the site
6. Use modern electronic surveying instruments (Total Station)

**COURSE CONTENT:**

| Unit | Topic/Sub-Topic | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | THEODOLITE | 30 | |
| | 1.1 Introduction, types, parts and various accessories of theodolite | | |
| | 1.2 Temporary and permanent adjustment of theodolite | | |
| | 1.3 Measurement of horizontal and vertical (interior and exterior) angles using theodolite | | |
| | 1.4 Methods of Measurement: Repetition and Reiteration | | |
| | 1.5 Methods of traversing with theodolite by measuring: including angle, direct angle, deflection angle | | |
| | 1.6 Traverse computation: Latitude and departure, consecutive co-ordinates, independent co-ordinates, adjustment of closing errors, angular errors and bearing ,simple problems | | |
| | 1.7 Methods of Triangulation, Braces Quadrilateral: Adjustments and Numerical Problems | | |
| | 1.8 Base Line Measurement method, correction of base line distance and extension of base | | |
| | 1.9 Principles of EDM: ***Total Station*** | | |
| 2.0 | TACHEOMETRY | 4 | |
| | 2.1 Introduction, tachometric constants: Determination | | |
| | 2.2 Methods of tachometric measurement: horizontal and inclined sight (no deduction) | | |
| 3.0 | CURVES | 8 | |
| | 3.1 Introduction, definition of different terms of curves | | |
| | 3.2 Uses of simple, compound, vertical and reverse curves in field | | |
| | 3.3 Methods of setting out of circular curve with transition: Linear method, Instrumental method | | |
| | 3.4 Simple problems on circular curves | | |
| 4.0 | FORMATIVE EVALUATION | 3 | |
| | TOTAL: | | **45** |

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Surveying Volume -1 | Dr. K.R. Arora | Standard Book House |
| 2. | Surveying Volume -2 | Dr. K. R. Arora | Standard Book House |
| 3. | Surveying & Levelling | S.C. Rangwala | Charotar Publishing House |
| 4. | Surveying – Volume 1 | S. Duggal | TMH |
| 5. | Surveying – Volume 2 | S. Duggal | TMH |
| 6. | Surveying & Levelling | N. Bask | TMH |
| 7. | Surveying, 7/e | Bannister | Pearson |
| 8. | Surveying & Levelling | R. Subramanian | Oxford University Press |

**PRACTICAL**

| Unit | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | CONTOURING: | 6 | |
| | 1.1   To prepare a contour map for a given plot by tachometric survey | | |
| | 1.2   Radial method | | |
| | 1.3   Grid method | | |
| 2.0 | THEODOLITE SURVEY | 12 | |
| | 2.1   Handling of theodolite, setting up and temporary adjustments | | |
| | 2.2   Measurement of horizontal and vertical angle | | |
| | 2.3   To prepare a closed traverse for a given plot using theodolite traverse | | |
| | 2.4   Triangulation survey using theodolite | | |
| 3.0 | INTRODUCTION TO TOTAL STATION | 6 | |
| | 3.1   Handling and Operation of the instrument | | |
| | 3.2   Recording of points and setting out (Traversing and Topography) | | |
| 4.0 | HORIZONTAL CURVES | 6 | |
| | 4.1   To set out a horizontal curves for a given alignment: Linear method, Linear and angular method | | |
| 5.0 | SURVEY CAMP | | |
| | 5.1   There should be survey camp of 2 week duration out side the campus, Specifically in an underdeveloped area using modern instruments | | |
| | **TOTAL:** | | **30** |

# DESIGN AND DETAILING OF STRUCTURE – I

| *L* | *T* | *P* | | ***Curri. Ref. No.: CE507*** |
|---|---|---|---|---|
| *3* | *1* | *2* | | |

| **Total Contact hrs.:** | **Total marks: 150** | **Theory:** |
|---|---|---|
| *Theory: 45* | | *End Term Exam: 75* |
| *Tutorial: 15* | | *P.A.: 25* |
| *Practical: 30* | | **Practical:** |
| **Theory Class duration:** | | *End Exam: 25* |
| *45 classes of 1hr. or* | | *I.A : 25* |
| *60 classes of 45 minutes* | | |

**Pre requisite: CE408**
**Credit: 5**

## RATIONALE:

Safety, serviceability and durability of a structure depend on appropriate design, proper detailing and construction as per detailed drawing and specification. For this reason, 'Design and Detailing' is an important subject for Civil Engineering Diploma holders. They are most often asked to act as a supervisor in construction projects. In addition to this they may also require to work as a draftsmen responsible for preparing detailed drawing for construction sites. Diploma holders are also called upon to assist designers, suggest modifications for repair and renovation works and also to design simple structural elements. The subject attempts to cover the aspects of reinforced concrete design and detailing

## AIM:

The subject aims to expose the civil engineering diploma students to design of simple R.C. structural elements and also to drawing structural details for construction.

## THEORY

| UNIT | TOPIC/SUB-TOPIC | | Hrs. | Total hrs. |
|---|---|---|---|---|
| 1.0 | Introduction to design & detailing | | 6 | |
| | 1.1 | State & explain the objectives of design & detailing | | |
| | 1.2 | Explain the advantages of Reinforced Concrete | | |
| | 1.3 | State the different methods of design | | |
| | 1.4 | Explain briefly the general concept, assumptions of Working Stress Method (WSM) of design | | |
| | 1.5 | State and explain different types of loads acting on structures: dead load, live load, wind load, seismic load and their combination (IS: 875 [Part I-V], IS: 1893-2002) | | |
| 2.0 | Limit State Method (LSM) of Design | | 5 | |
| | 2.1 | Define Limit States | | |
| | 2.2 | State & explain limit states of collapse, serviceability and durability | | |

6.2 Perform design of simply supported rectangular two-way slabs as per IS 456-2000 bending moment co-efficients, solve problems

7.0 Axially loaded short columns (LSM)      4
     7.1 Explain short columns, braced and unbraced columns, effective length of columns, design formula for short columns, minimum accidental eccentricity, minimum longitudinal reinforcement and transverse reinforcement, detailing at junctions with beams and footing
     7.2 Perform design of axially loaded short columns using IS 456 & SP-16

**SESSIONAL ASSIGNMENTS**

8.0 Draw the following with necessary details & schedule of bars    27
     from supplied hand sketches or given references such as SP 34
     (a) Simply supported beam, continuous beam, cantilever beam.
     (b) One way and two way slab, cantilever slab and chajja
     (c) RCC columns.
9.0 FORMATIVE EVALUATION      3

                          **TOTAL:**          **75**

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Reinforced Concrete Design | Pillai & Mennon | TMH |
| 2. | Design of Reinforced Concrete Structures | Gambhir | PHI Learning |
| 3. | Fundamentals of Reinforced Concrete Design | Gambhir | PHI Learning |
| 4. | Advanced Reinforced Concrete Design, 2$^{nd}$ ed. | Varghese | PHI Learning |
| 5. | Reinforced Concrete Design: Principles and Practice | Krishna, Raju N. | New Age International (P) Ltd. |
| 6. | Reinforced Concrete Design | S. N. Sinha | TMH |
| 7. | RCC Designs (Reinforced Concrete Structures) | B. C. Punmia, Ashok Jain & Arun Jain | Laxmi Publication |
| 8. | Limit State Design of Reinforced Concrete | B. C. Punmia, Ashok Jain & Arun Jain | Laxmi Publication |
| 9. | Design of Reinforced Concrete Structures (IS: 456-2000) | Krishana Raju | CBS Publishers |

# CONCRETE TECHNOLOGY

| L | T | P | | *Curri. Ref. No.: CE508* |
|---|---|---|---|---|
| 3 | 1 | 2 | | |

**Total Contact hrs.:**    **Total marks: 150**    *Theory:*
*Theory: 45*    *End Term Exam: 75*
*Tutorial: 15*    *P.A.: 25*
*Practical: 30*    **Practical:**
**Theory Class duration:**    *End Term Exam: 25*
*45 classes of 1hr. or*    *I.A.: 25*
*60 classes of 45 minutes*
**Pre requisite: CE401**
**Credit: 5**

| Unit | Topic/Sub-Topic | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | CONCRETE AS A CONSTRUCTION MATERIAL: | 1 | |
| | 1.1    Grades of concrete | | |
| | 1.2    Advantage and disadvantages of concrete | | |
| | 1.3    Concept of quality control of concrete | | |
| 2.0 | CEMENT | 2 | |
| | 2.1    Composition, hydration of cement, water-cement ratio and compressive strength, fineness of cement, setting time, soundness, types of cement. | | |
| 3.0 | AGGREGATE | 2 | |
| | 3.1    Classification and characteristics of aggregate, deleterious substances in aggregates, fineness modulus, grading of aggregate. | | |
| 4.0 | WATER: | 1 | |
| | 4.1    Quality of mixing water, curing water | | |
| 5.0 | ADMIXTURES: | 2 | |
| | 5.1    Important functions, classification of admixtures, accelerating admixtures, retarding admixtures, water-reducing admixtures, air-containing admixtures, mineral admixtures. | | |
| 6.0 | PROPERTIES OF FRESH CONCRETE: | 3 | |
| | 6.1    Concept of fresh concrete, Workability, slump test, compacting factor test, Ve-bee consistency test and flow test, requirement of workability. | | |
| 7.0 | PROPERTIES OF HARDENED CONCRETE: | 3 | |
| | 7.1    Role of water/cement ratio on strength, cube and cylinder compressive strengths, flexural strength of concrete, stress-strain and elasticity, phenomena of creep and shrinkage, permeability, durability of concrete, sulphate and acid attack on concrete, efflorescence. | | |
| 8.0 | QUALITY AND CONTROL OF CONCRETE: | 3 | |
| | 8.1    Materials, workmanship etc. as per IS:456, acceptance criteria as per IS:456, quality management in concrete construction. | | |
| 9.0 | PROPORTIONING OF CONCRETE MIXERS: | 6 | |

9.1 Basic consideration for concrete mix design, choice of ingredients of the mix, grade designation, type of cement, maximum nominal size of coarse aggregate, grading of combined aggregate (IS : 483-1963 limits), analytical method, water-cement ratio, workability, durability, mix proportioning as per IS:10262 – 2009.

10.0 PRODUCTION OF CONCRETE: 4

10.1 Batching of materials, mixing of concrete materials, transportation, placing of concrete, compaction of concrete compaction methods, vibrators, precautions for compaction by vibrators, curing of concrete, effects of delayed curing, form work-requirements and types, stripping of forms.

11.0 INSPECTION AND TESTING: 4

11.1 Inspection testing of fresh concrete, workability tests, acceptance testing of hardened concrete, surface hardness method, pulse velocity method, core test method.

12.0 HIGH PERFORMANCE CONCRETE: 3

12.1 Introduction to Silica fume concrete, mass concrete, ferro-cement, construction in ferro-cement and applications, concrete materials used, definitions and fundamental principles, fibre reinforced concrete and its application, polymer concrete--types and application.

13.0 DETERIORATION OF CONCRETE AND ITS PREVENTION: 2

13.1 Types of deterioration, corrosion of reinforcement, effects and prevention.

14.0 REPAIR & REHABILITATION TECHNOLOGY FOR CONCRETE STRUCTURES: 6

14.1 Symptom, cause, prevention and remedy of defects during construction, cracking of concrete due to different reasons, repair of cracks for different purposes, selection of techniques, polymer-based repairs, common types of repairs, shot-crete concrete or gunniting.

15.0 FORMATIVE EVALUATION 3

**TOTAL :** **45**


**PRACTICAL**

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|------|-----------------|------|------------|
| 16.0 | | | 30 |
| | 16.1 Determination of normal consistency of cement | | |
| | 16.2 Determination of initial and final setting time of cement (sample of hardened ring marks after final setting to be shown to the students) | | |
| | 16.3 Determination of fineness of cement by sieving and soundness of cement by Le Chatelier apparatus | | |
| | 16.4 Determination of compressive strength of cement | | |
| | 16.5 Grading analysis of fine and coarse aggregates by sieving | | |
| | 16.6 Concrete mix design: 4 trial mixes to be performed with workability (slump) and compressive strength (cube) tests | | |
| | 16.7 Preliminary NDT tests like Rebound Hammer, USPV tests | | |

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Concrete Technology | Neville | Pearson |
| 2. | Concrete Technology | M. L. Gambhir | Tata McGraw Hill |
| 3. | Concrete Technology | A.R. Santhakumar | Oxford University Press |
| 4. | Laboratory Manual on Concrete Technology | Sood, Mittal & Kulkarni | CBS Publisher |
| 5. | Concrete Technology | R. P. Rethaliya | Charotar Publishing House |
| 6. | Textbook of Concrete Technology | Kulkarni, P. D. | New Age International (P) Ltd. |
| 7. | IS: Codes — IS: 456 – 2000, 10262 – 2009, 383, 1199, 4031, 4032, 269, 8112, 12269, 455 | | Bureau of Indian Standards |

# DESIGN AND DETAILING OF STRUCTURE – II

| L | T | P | **Curri. Ref. No.: CE509** |
|---|---|---|---|
| *3* | *1* | *2* | |

| **Total Contact hrs.:** | **Total marks: 150** | **Theory:** |
|---|---|---|
| *Theory: 45* | | *End Term Exam: 75* |
| *Tutorial: 15* | | *P.A.: 25* |
| *Practical: 30* | | **Practical:** |
| **Theory Class duration:** | | *End Exam: 25* |
| *45 classes of 1hr. or* | | *I.A: 25* |
| *60 classes of 45 minutes* | | |
| **Pre requisite: CE406** | | |
| **Credit: 5** | | |

## RATIONALE:

Safety, serviceability and durability of a structure depend on appropriate design, proper detailing and construction as per detailed drawing and specification. For this reason, 'Design and Detailing is an important subject for Civil Engineering Diploma holders. They are most often asked to act as a supervisor in construction projects. In addition to this they may also require to work as a draftsmen responsible for preparing detailed drawing for construction sites. Diploma holders are also called upon to assist designers, suggest modifications for repair and renovation works and also to design simple structural elements. The subject attempts to cover designing and detailing of mainly steel structures.

## AIM:

The subject aims to expose the civil engineering diploma students to design of simple structural elements and also to drawing structural details for construction.

## THEORY

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | Design of simple steel structures | | 15 |
| | 1.1 State and sketch types of joints, explain and show failure of joints through sketches. | | |
| | 1.2 State the permissible stresses in rivets and bolts; Design joints (excluding joints subjected to moments). | | |
| | 1.3 Design determinate framed structure connections, solve problems for riveted and bolted connections. | | |
| | 1.4 Welding: State and explain the uses and types of welding. | | |
| | 1.5 State the permissible stresses in welding, minimum size of welding. | | |
| | 1.6 Design simple welded connections for axial forces. | | |
| 2.0 | Tension Members | | 5 |
| | 2.1 State and sketch the common sections of tension members. State the permissible stresses for structural steel. | | |

2.2 Explain the net effective sectional area for angles and tees under different conditions, use structural steel section hand book, Design tension members (angle & tubular sections) with detailing, and solve problems.

3.0     Compression Members     5
     3.1   Distinguish between a strut and a column, short and a long column. Explain effective length, state maximum slenderness ratio of different compression members.
     3.2   Explain and perform design of axially loaded compression members (angle & tubular sections) as per IS 800, solve problems
     3.3   Design of column bases

4.0     Design of simple steel beams for bending and shear     3

5.0     Stair Case (RCC - LSM)     4
     5.1   State & draw important types of staircases, explain effective span & principles of design
     5.2   Design a dog-legged stair case and show the details of reinforcement

6.0     Design of footings (RCC - LSM)     4
     6.1   State and sketch different types of footings
     6.2   Explain design loads for foundation design, basis of design of footings, soil pressure on foundation, checking for development lengths, procedure for design of footings, tie beams
     6.3   Design simple masonry foundation and R.C. slab foundation for a masonry wall
     6.4   Design isolated reinforced concrete square & rectangular footings for given data & draw detailed drawings
     6.5   Solve problems

7.0     FORMATIVE EVALUATION     3

              **TOTAL:**     **45**


**SESSIONAL ASSIGNMENTS**

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| 8.0 | Structural Detailing | 30 | |
| | 8.1 Draw details of the following steel structures from the given line diagrams: | | |
| |     a) A steel roof truss with details of bolted or riveted and welded joints and connections including that of the steel column at base level with foundation | | |
| | 8.2 Detailing of a RCC dog-legged staircase. | | |
| | 8.3 Detail of a load bearing wall footing | | |
| | 8.4 Details of a square and rectangular RCC footing | | |
| | **TOTAL:** | | **30** |

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Reinforced Concrete Design | Pillai & Mennon | TMH |
| 2. | Design of Reinforced Concrete Structures | Gambhir | PHI Learning |
| 3. | Advanced Reinforced Concrete Design, 2$^{nd}$ ed. | Varghese | PHI Learning |
| 4. | Reinforced Concrete Design: Principles and Practice | Krishna, Raju N. | New Age International (P) Ltd. |
| 5. | Reinforced Concrete Design | S. N. Sinha | TMH |
| 6. | Limit State Design of Reinforced Concrete | B. C. Punmia, Ashok Jain & Arun Jain | Laxmi Publication |
| 7. | Design of Reinforced Concrete Structures (IS: 456-2000) | Krishana Raju | CBS Publishers |
| 8. | Design of Steel Structure | Gaylord | TMH |
| 9. | Design of Steel structures | S. Duggal | TMH |
| 10. | Design of Steel structures | R. Raghupati | TMH |
| 11. | Design of Steel structures | L. Negi | TMH |
| 12. | Design of Steel Structures | Sairam | Pearson |
| 13. | Steel Structures | N. Subramanian | Oxford University Press |
| 14. | Design of Steel Structures | N. Subramanian | Oxford University Press |
| 15. | Comprehensive Design of Steel structures | B. C. Punmia, Ashok Jain & Arun Jain | Laxmi Publication |
| 16. | Design of Steel Structures – Volume 1 | Ramchandra | Standard Book House |
| 17. | Design of Steel Structures – Volume 2 | Ramchandra | Standard Book House |
| 18. | IS Codes: IS 456-2000, 800-2007 | | |

# EARTHQUAKE RESISTANT DESIGN & CONSTRUCTION

*L       T       P*                                     ***Curri. Ref. No.: CE510***
*3       0       0*

**Total Contact hrs.:**            **Total marks: 100**            ***Theory:***
*Theory: 45*                                                *End Term Exam: 75*
**Theory Class duration:**                                  *P.A.: 25*
*45 classes of 1hr. or*
*60 classes of 45 minutes*
**Pre requisite: Nil**
**Credit: 3**

## RATIONALE:

The subject Earthquake Resistant Design and Construction is very important in the present day's context. This is particularly relevant for earthquake prone areas like Northeastern part of India. So it is felt that a course to cover these aspects of Civil Engineering should be mandatory in the diploma curriculum also.

## AIM:

To develop basic understanding about earthquake and earthquake resistant design and construction. To get acquainted with specifications of Indian Codes of practice is this regard and detailing requirement for earthquake resistant structures.

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|------|-----------------|------|------------|
| 1.0 | INTRODUCTION | 6 | |
| | 1.1   Introduction to earthquakes, causes of earthquakes | | |
| | 1.2   Brief history of major earthquakes in the past | | |
| 2.0 | STRUCTURAL CONFIGURATION | 4 | |
| | 2.1   Advantages of regular, simple and symmetrical configurations over irregular ones | | |
| | 2.2   Use of separation joints (IS:4326) | | |
| 3.0 | USE OF CONCRETE BANDS, TIES AND REINFORCEMENTS IN MASONRY CONSTRUCTION | 4 | |
| | 3.1   Reinforced Masonry work | | |
| 4.0 | USE OF TIMBER CONSTRUCTION IN EARTHQUAKE RESISTANT DESIGN (IS:4326) | 4 | |
| 5.0 | INTRODUCTION TO IS: 1893 – 2002 (PART 1) | 12 | |
| | 5.1   Magnitude and Intensity of earthquakes | | |
| | 5.2   Seismic zoning | | |
| | 5.3   Definition of terms related to earthquake engineering — ordinary and special moment resistant frames, shear wall, separation sections, centre of mass, centre of rigidity, ductility, storey drift. | | |
| | 5.4   General principles of earthquake resistant design, MCE, DBE | | |
| 6.0 | DETAILED DISCUSSIONS ON DUCTILE DETAILING OF RC STRUCTURES AS PER IS: 13920 | 12 | |
| 7.0 | FORMATIVE EVALUATION | 3 | |
| | **TOTAL:** | | **45** |

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Elements of Earthquake Engineering | Jai Krishna & Jain | South Asian Publishers Private Limited |
| 2. | Earthquake Resistant Design of Structures | Agarwal & Shrikhande | PHI |
| 3. | Earthquake Resistant Design of Structures | S.K. Duggal | Oxford University Press |
| 4. | Fundamentals of Soil Dynamics and Earthquake Engineering | Prasad | PHI Learning |
| 5. | Geotechnical Earthquake Engineering | Kramer | Pearson |
| 6. | Earthquake tips | C. V. R. Murthy | Publication of Nicee |
| 7. | Publications of nicee | | IIT Kanpur |
| 8. | Relevant IS Codes: 1893, 4326, 13920 | | |
| 9. | Website: www.nicee.org | | |

# ELECTIVE COURSES

# PROFESSIONAL PRACTICES
# & CONSTRUCTION MANAGEMENT (Elective)

| L | T | P | |
|---|---|---|---|
| 3 | 1 | 0 | *Curri. Ref. No.: CE601A* |

**Total Contact hrs.:**      **Total marks: 100**      *Theory:*
*Theory: 45*                                      *End Term Exam: 75*
*Tutorial:15*                                           *P.A.: 25*
**Theory Class duration:**
*60 classes of 1hr. or*
*80 classes of 45 minutes*
**Pre requisite: CE410**
**Credit: 4**

## RATIONALE:

The knowledge of this subject is required for all engineers / technicians for working at the site/ field. This course includes the various aspects of constructional planning, construction organization and organizational behaviour including group dynamics, monitoring of progress and safety practices and quality control.

## AIM:

The course content of Professional Practice and Construction Management has been designed to provide adequate information to develop competency in a learner to-

1. Plan simple constructional activity
2. Prepare construction schedule
3. Handle material and T&P stores
4. Manage the work site
5. Work as member/ group leader in a construction team
6. Resolve disputes during construction activity
7. Adopt appropriate constructional safety practices.
8. Maintain quality of construction work

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | MANAGEMENT | 3 | |
| | 1.1 Meaning and concept of management | | |
| | 1.2 Principles and function of management | | |
| | 1.3 Leadership and decision making –styles and steps of decision making | | |
| 2.0 | MANAGEMENT OF CONSTRUCTION | 4 | |
| | 2.1 Organisation of Work- preparation of a general Programme, forecast of requirements in terms of information plant, transport, labour and materials, progress of work | | |
| | 2.2 Introduction to the application of network planning and scheduling technique in constructional management | | |
| | 2.3 Definition of PERT & CPM of constructional management | | |
| 3.0 | ORGANISATION OF ENGINEERING DEPARTMENTS | 1 | |

3.1 Regular and work – charged establishment , duties of a subordinate Engineer

4.0 WORKS                                                                  4
  4.1 Classification of Work-original, minor, petty
  4.2 Repair Work-annual repair, quadrennial repair special repair
  4.3 Methods of execution of work-through contractor departmentally, contract, contract agreement, Work-order, item rate contract, lump-sum contract, labour contract, employment of daily labour, piece work agreement , schedule contract cost plus percentage contract

5.0 ACCOUNTS                                                               24
  5.1 Explanation of various terms-Administrative approval, technical sanction, contingencies, budget, tender, earnest money, security deposit, advance payment, on account payment, intermediate payment, final payment, running bill, final bill, regular and temporary establishment
  5.2 Cash, major head and sub-head of accounts, temporary advance, issue rate, storage charges, supervision charges, suspense account, debit, credit, book transfer, sub- voucher, APR register of expenditure
  5.3 Measurement Book- use of measurement book. Maintenance procedure of making entries of measurement book, supply of materials, labour employed, standard measurements, common irregularities
  5.4 Master roll-necessity of forms, precaution, making payment on Master rolls, unpaid wages, common irregularities
  5.5 Aquitance Roll- Its preparation and use for making payment of pay and wages
  5.6 Labour and Labour report- method of labour payment, use of forms and necessity of submission

6.0 STORES                                                                 3
  6.1 Classification of stores, stock head, sub-head of account
  6.2 Receipt, issue statement of standard forms, method of preparation of stock-account, preparation and submission of returns, verification of stock, storage of stock

7.0 TOOLS AND PLANTS                                                       3
  7.1 Issue and receipt register and verification of tools and plants
  7.2 Materials at sight account, returns use of forms, verification of stock, disposal of surplus materials, shortage and excess
  7.3 Survey report-disposal of unserviceable and surplus materials

8.0 FORMATIVE EVALUATION                                                   3

                                              **TOTAL:**              **45**

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Construction Planning and Management | Dhir, B. M. | New Age International (P) Ltd. |
| 2. | Construction Planning & Technology | Rajiv Gupta | CBS Publishers |
| 3. | Construction Planning, Equipment and Methods | Peurifoy | TMH |
| 4. | Construction Management Practices | V.K. Raina | TMH |
| 5. | PERT & CPM Principles and Applications | Srinath L.S. | East West Press |
| 6. | Construction Planning and Management | Gahlot P.S. and Dhir, B.M. | Wiley Eastern Limited |
| 7. | Management in Construction Industry | P.P.Dharwadker | Oxford & IBH |
| 8. | Text Book of PWD Account | S.C. Dixit | |
| 9. | PWD Accounts | A.C. Dhar | |
| 10. | Engineering Duties & Accounts | S.K. Hussain | |

# ENVIRONMENTAL ENGINEERING (Elective)

*L*      *T*      *P*                                    ***Curri. Ref. No.: CE601B***
*3*      *1*      *0*

**Total Contact hrs.:**          **Total marks: 100**          **Theory:**
*Theory: 45*                                                 *End Term Exam: 75*
*Tutorial:15*                                                *P.A.: 25*
**Theory Class duration:**
*45 classes of 1hr. or*
*60 classes of 45 minutes*
**Pre requisite: CE409**
**Credit:**

## RATIONALE:

The construction activities taken up by the technical personnel, civil engineering technicians in particular, are responsible for the environmental degradation. The civil engineers are also responsible for adopting the remedial measures. As such, a civil engineering diploma holder should have adequate knowledge about the types of pollution caused by various construction activities for adopting preventive and remedial measures. They should be also be aware of the various environmental laws for effective control of environmental pollution.

## AIM:

The course content of Environmental Engineering has been designed to provide adequate information to develop competency in a learner to-

1.   Explain the different aspects of environmental engineering
2.   Relate the various components of ecosystem
3.   Identify the sources and effects of environmental pollution
4.   Analyze the polluted water, air and soil by using appropriate sampling method
5.   Describe the role of various agencies in environmental pollution and the environmental laws.

**COURSE CONTENT:**

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|------|-----------------|------|------------|
| 1.0 | INTRODUCTION: | 04 | |
| 1.1 | Definition of environment and components of Environment and related terms | | |
| 1.2 | Aims & objectives of environmental engineering | | |
| 1.3 | Impact of population growth, industrialization & urbanization and energy growth on environment | | |
| 1.4 | Current issues of environmental concern like-Global warming, Acid rain, Ozone depletion-features, causes and impacts on living being | | |
| 2.0 | ECOLOGY: | 06 | |
| 2.1 | Concepts of ecosystem and its component | | |
| 2.2 | Energy flow through an ecosystem | | |
| 2.3 | Biochemical cycles-C,N,P | | |
| 2.4 | Interrelationships between communities in an ecosystem | | |
| 2.5 | Sustainable development | | |
| 3.0 | ENVIRONMENTAL POLLUTION: | 15 | |
| 3.1 | Definition of terms, parameters of pollution, types of pollution | | |
| 3.2 | Water Pollution- Types of pollutants & their characteristics, Sources of pollutants, effects of water pollution, standards for industrial effluents, remedial measures for control | | |
| 3.3 | Air Pollution- Types of pollutants & their characteristics Sources of pollutants, effects of pollutants on human, plants &vegetation, structures etc, permissible limits as per Indian and International standard, remedial measures for control | | |
| 3.4 | Noise Pollution-definition and measure of noise, types, Sources of pollution, effects of noise pollution, prevention & control measures | | |
| 3.5 | Land Pollution- Causes, Effects of Pesticides & fertilizers used in agricultural practice, impacts of blasting & open cast mining, degradation due to deforestation and due to natural disaster like land subsidence, case studies on mining; blasting and deforestation, soil pollution management-land conservation and land reclamation | | |
| 4.0 | POLLUTION SURVEY: | 05 | |
| 4.1 | Planning survey, sampling locations, criterion, equipment, and techniques for water & air pollution survey | | |
| 4.2 | Analysis of water and air pollutants-principles & methods | | |
| 5.0 | SOLID WASTE MANAGEMENT: | 06 | |
| 5.1 | Definition of related terms and purpose | | |
| 5.2 | Sources of solid wastes, characteristics of wastes-urban & rural communities, sampling methods | | |

      5.3    Storage & collection- storage methods, frequency of collection, methods of collection, comparison

      5.4    Disposal of solid wastes- principles, description of process, planning, operation, maintenance & suitability of different methods of disposal- sanitary land fill, composting, incineration

6.0    ENVIRONMENTAL MANAGEMENT:             06

      6.1    Environmental legislation- salient features of different environmental protection acts in India

      6.2    Roles of pollution control boards, local bodies and citizens in environmental pollution management

      6.3    Environmental impact assessment- requirements and definition of related terms, method of assessment

      6.4    Environmental ethics

7.0    FORMATIVE EVALUATION               03

**TOTAL:**      **45**

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Introduction to Environmental Engineering and Science, 3rd ed. | Masters & Ela | PHI Learning |
| 2. | Textbook of Environmental Engineering | Rao | PHI Learning |
| 3. | Basic Environmental Engineering | Gaur, R. C. | New Age International (P) Ltd. |
| 4. | Introduction to Environmental Engineering | M. Davis & D. Cornwell | TMH |
| 5. | Environmental Engineering | N. Bask | TMH |
| 6. | Environmental Engineering | Saravananae | Pearson |
| 7. | Environmental Engineering, 4e | Weiner | Elsevier |

# TUNNELS & BRIDGES (Elective)

| L | T | P | | *Curri. Ref. No.: CE601C* |
|---|---|---|---|---|
| *3* | *1* | *0* | | |

**Total Contact hrs.:**  **Total marks: 100**  **Theory:**
*Theory: 45*                                            *End Term Exam: 75*
*Tutorial: 15*                                          *P.A.: 25*

**Theory Class duration:**
*45 classes of 1hr. or*
*60 classes of 45 minutes*
**Pre requisite: Nil**
**Credit: 4**

## RATIONALE:

Tunnels and bridges constitute important specialized components of Transportation Engineering. Many–a-times diploma holders are involved in the construction of tunnels and bridges. As there is no common subject to cover the preliminary parts of the subject topics, they are covered in an elective subject, so that interested students have a chance to acquire necessary preliminary knowledge in the subject.

## AIM:

The aim of the subject 'Tunnels and Bridges' is to impart knowledge of different components of tunnels and bridges through informative statements, description, explanation and sketches to the diploma students of civil engineering intending to be involved in the construction and maintenance of tunnels and bridges.

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| | TUNNELS | | |
| 1.0 | Introduction: | 1 | |
| | 1.1    Definition of tunnels | | |
| | 1.2    Necessity of tunnels | | |
| | 1.3    Functions of tunnels | | |
| | 1.4    Advantages & disadvantages of tunnels | | |
| 2.0 | TUNNEL SURVEYING | 3 | |
| | 2.1    Factors affecting alignment & grade of a tunnel | | |
| | 2.2    Method of location of centre line of tunnel on the ground | | |
| | 2.3    Method of transferring the centre line of tunnel to inside of tunnel | | |
| 3.0 | Size & Shape of Tunnel | 2 | |
| | 3.1    Different shapes of tunnels - description, sketches | | |
| | 3.2    Factors affecting the size of tunnels | | |
| | 3.3    Typical sectional views of tunnels for (a) a National Highway (b) a single & double broad gauge railway track | | |
| 4.0 | Construction of tunnels: | 3 | |
| | 4.1    Methods of tunneling in rocks | | |

|       |      |                                                           |   |
|-------|------|-----------------------------------------------------------|---|
|       | 4.2  | Operations involved in tunneling in rocks                 |   |
|       | 4.3  | Methods of tunneling in soft soil                         |   |
|       | 4.4  | Safety precautions to be adopted in tunneling             |   |
|       | 4.5  | Maintenance of tunnels                                    |   |
| 5.0   | Ventilation of tunnels                                     | 1 |
|       | 5.1  | Necessity of ventilation                                  |   |
|       | 5.2  | Methods of ventilation                                    |   |
|       | 5.3  | Shafts - purpose, classification, location                |   |
|       | 5.4  | Methods of dust control                                   |   |
| 6.0   | Tunnel Lining                                              | 2 |
|       | 6.1  | Necessity of lining                                       |   |
|       | 6.2  | Functions of lining                                       |   |
|       | 6.3  | Types of lining                                           |   |
|       | 6.4  | Operations involved in lining of tunnels                  |   |
| 7.0   | Drainage of tunnels                                        | 1 |
|       | 7.1  | Necessity of drainage                                     |   |
|       | 7.2  | Methods of drainage                                       |   |

**BRIDGES**

|       |      |                                                           |   |
|-------|------|-----------------------------------------------------------|---|
| 8.0   | Introduction:                                              | 2 |
|       | 8.1  | Definitions                                               |   |
|       | 8.2  | Components of a bridge                                    |   |
|       | 8.3  | Classification of bridges                                 |   |
|       | 8.4  | Requirements of an ideal bridge                           |   |
| 9.0   | Bridge Site investigation, hydrology & planning           | 4 |
|       | 9.1  | Selection of bridge site                                  |   |
|       | 9.2  | Bridge alignments                                         |   |
|       | 9.3  | Determination of flood discharge                          |   |
|       | 9.4  | Waterway & economic span                                  |   |
|       | 9.5  | Afflux, clearance & free board                            |   |
|       | 9.6  | Collection of bridge design data & sub surface investigation |   |
| 10.0  | Bridge foundation                                          | 4 |
|       | 10.1 | Scan depth, minimum depth of foundation                   |   |
|       | 10.2 | Types of bridge, foundations - spread foundation, pile foundation - pile driving, well foundation - sinking of wells, caisson foundation |   |
|       | 10.3 | Coffer dams                                               |   |
| 11.0  | Bridge substructure and approaches                        | 4 |
|       | 11.1 | Piers & types - forces acting & design principles         |   |
|       | 11.2 | Abutments, types - forces acting & design principles      |   |
|       | 11.3 | Wing walls, types and their stability                     |   |
|       | 11.4 | Approaches                                                |   |
| 12.0  | Permanent bridges                                          | 4 |
|       | 12.1 | Masonry bridges                                           |   |
|       | 12.2 | Steel bridges - classification brief description with sketches - plated girder bridges, truss bridges, steel arch bridges, rigid frame steel bridges, cable stayed bridges, continuous steel bridges, suspension bridges |   |

|      | 12.3 | Concrete bridges - classification, brief description with sketches - slab & girder bridges, balanced cantilever bridges, continuous bridges, arch bridges, rigid frame bridges, pre-stressed concrete bridges. | |
| --- | --- | --- | --- |
|      | 12.4 | IRC bridge loading | |
| 13.0 | Culverts & causeways | | 3 |
|      | 13.1 | Types of culverts - brief description | |
|      | 13.2 | Types of causeways - brief description | |
| 14.0 | Bridge details | | 3 |
|      | 14.1 | Bridge bearing - types with brief description & sketches | |
|      | 14.2 | Joints in bridges - description with sketches | |
|      | 14.3 | Railings | |
| 15.0 | Movable bridges - Swing bridges, bascular bridges, Transer bridges, Transporter bridges, lift bridges | | 2 |
| 16.0 | Methods of Bridge Construction & Maintenance | | 3 |
|      | 16.1 | Erection of steel girder, truss, RCC | |
|      | 16.2 | Maintenance of bridges | |
| 17.0 | FORMATIVE EVALUATION | | 3 |

**TOTAL:** 45

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
| --- | --- | --- | --- |
| 1. | Harbour Dock and Tunnel Engineering | R. Srinivasan | Charotar Publishing House |
| 2. | Railway Bridge and Tunnel Engineering | K. Rangawala Dalal | Charotar Publishing House |
| 3. | Principles and Practice of Bridge Engineering | S.P. Bindra | Dhanpat Rai & Sons |
| 4. | Roads, Railways, Bridges and Tunnel Engineering | Ahuja & Biroi | Standard Book House |
| 5. | Tunnel Engineering | S.P. Bindra | Dhunpat Rai & Sons |
| 6. | Roads, Railways, Bridges & Tunnel Engineering | B.L. Gupta & A. Gupta | Standard Publishers |

# ADVANCED SURVEY (Elective)

| L | T | P | | *Curri. Ref. No.: CE602A* |
|---|---|---|---|---|
| *1* | *0* | *4* | | |

**Total Contact hrs.:**          **Total marks: 100**          **Practical:**
*Theory: 15*                                                                              *End Term Exam: 50*
*Practical: 60*                                                                          *I.A.: 50*
**Theory Class duration:**
*45 classes of 1hr. or*
*60 classes of 45 minutes*
**Pre requisite: Nil**
**Credit: 3**

## RATIONALE:

Now a days application of computer software in Civil Engineering analysis, design and drawing has become a routine. Though the diploma level students are not directly associated with detailed analysis and design, they must know how to create an interpret the drawings. Hence this course will be immensely helpful in their service life.

## AIM:

To familiarize the students about the use of modeling software along with a basic introduction to analysis and design software.

## COURSE CONTENT:

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | TRIANGULATION SURVEY | | |
| | 1.1 Angle Measurements and Solution of Braced Quadrilateral Network; Determination of Azimuth of a Line | 4+16 | 20 |
| 2.0 | DETAIL TOPOGRAPHIC | 4+12 | 16 |
| | 2.1 Fill in works by Plain Tabling and Contouring using radial and spot levelling methods | | |
| | 2.2 Tacheometric Survey | | |
| 3.0 | TOTAL STATION AND ITS APPLICATION | 7+28 | 35 |
| | 3.1 Detail Survey and Profile Levelling; Calculation of Area and Volume | | |
| | 3.2 Engineering Surveys: Setting out of Curves – Horizontal: Simple, Compund, Reverse and Transition, Vertical. Hydrographic Survey and Tunneling. | | |
| 4.0 | FORMATIVE EVALUATION | 4 | |
| | **TOTAL:** | | **75** |

**REFERENCE BOOKS:**

| Sl. No. | Name of Book | Author | Publishers |
|---|---|---|---|
| 1. | Surveying Volume -1 | Dr. K.R. Arora | Standard Book House |
| 2. | Surveying Volume -2 | Dr. K. R. Arora | Standard Book House |
| 3. | Surveying & Levelling | S.C. Rangwala | Charotar Publishing House |
| 4. | Surveying – Volume 1 | S. Duggal | TMH |
| 5. | Surveying – Volume 2 | S. Duggal | TMH |
| 6. | Surveying & Levelling | N. Bask | TMH |
| 7. | Surveying, 7/e | Bannister | Pearson |
| 8. | Surveying & Levelling | R. Subramanian | Oxford University Press |
| 9. | Advanced Surveying: Total Station, Gis And Remote Sensing | Gopi | Pearson Education India |
| 10. | Higher Surveying | A. M. Chandra | New Age International |

# COMPUTER AIDED DESIGN & DRAWING (Elective)

*L*     *T*     *P*                       ***Curri. Ref. No.: CE602B***
*1*     *0*     *4*

**Total Contact hrs.:**     **Total marks: 100**     **Practical:**
*Theory: 15*                                           *End Term Exam: 50*
*Practical: 60*                                         *I.A.: 50*
**Theory Class duration:**
*45 classes of 1hr. or*
*60 classes of 45 minutes*
**Pre requisite: Nil**
**Credit: 3**

**RATIONALE:**
Now a days application of computer software in Civil Engineering analysis, design and drawing has become a routine. Though the diploma level students are not directly associated with detailed analysis and design, they must know how to create an interpret the drawings. Hence this course will be immensely helpful in their service life.

**AIM:**
To familiarize the students about the use of modeling software along with a basic introduction to analysis and design software.

**COURSE CONTENT:**

| UNIT | TOPIC/SUB-TOPIC | Hrs. | Total hrs. |
|---|---|---|---|
| 1.0 | INTRODUCTION TO A MODELING SOFTWARE (AUTOCAD OR ANY OTHER SIMILAR DRAFTING SOFTWARE) | | |
| | 1.1 To use software for drawing different types of structures including masonry and reinforced concrete ones. Drawing of different structural elements like beams, slabs, columns and foundations showing placement of different types of reinforcements. | 5+20 | 25 |
| 2.0 | INTRODUCTION TO A ANALYSIS AND DESIGN SOFTWARE (STAAD.PRO OR EQUIVALENT SOFTWARE) | 10+36 | 46 |
| | 2.1 Utility of the software and its application in Civil Engineering | | |
| | 2.2 Basic screen orientation, overview of the different steps to be followed for modeling a structure, different components of an input file, axes system, unit system, different types of structures and structural element that can be analyzed, model generation of simple beams and columns by building the structure geometry assigning the properties and at5eruals loads, analysis. | | |
| 3.0 | FORMATIVE EVALUATION | 4 | |
| | **TOTAL:** | | **75** |

# SAMPLE PATH

**SAMPLE PATH:** TERM - I

| Sl. No | Code | Course | Study Scheme | | | | Evaluation Scheme | | | | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Pre-requisite | Contact Hours / Week | | | Theory | | | Practical | | | | |
| | | | | L | T | P | End Exam | Progressive Assessment | | End Exam | Progressive Assessment | | | |
| | | | | | | | | Class Test | Assignment | | Sessional | Viva-voce | | |
| 1 | G101 | Communication Skill-I | | 3 | 0 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 3 |
| 2 | G103 | Mathematics-I | | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 3 | G105 | Physics - I | | 3 | 0 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 4 |
| 4 | G107 | Chemistry - I | | 3 | 0 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 4 |
| 5 | G201 | Engineering Drawing – I | | 1 | 0 | 3 | 50 | 0 | 0 | 0 | 50 | 0 | 100 | 3 |
| 6 | G203 | Workshop Practice - I | | 1 | 0 | 3 | 0 | 0 | 0 | 50 | 50 | 0 | 100 | 3 |
| 7 | G205 | Introduction to Computer Programming | | 2 | 1 | 2 | 50 | 0 | 0 | 25 | 25 | 0 | 100 | 4 |
| 8 | G109 | NCC (I) / NSS (I) | | 0 | 0 | 2 | 0 | 0 | 0 | 25 | 25 | 0 | 50 | 1 |
| | | **TOTAL** | | **16** | **2** | **14** | **400** | **40** | **60** | **150** | **200** | **0** | **850** | **26** |

**SAMPLE PATH:** TERM – II

| Sl. No | Code | Course | Study Scheme | | | | Evaluation Scheme | | | | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Pre-requisite | Contact Hours / Week | | | Theory | | | Practical | | | | |
| | | | | L | T | P | End Exam | Progressive Assessment | | End Exam | Progressive Assessment | | | |
| | | | | | | | | Class Test | Assignment | | Sessional | Viva-voce | | |
| 1 | G102 | Communication Skill – II | 101 | 2 | 1 | 2 | 50 | 0 | 0 | 25 | 25 | 0 | 100 | 4 |
| 2 | G104 | Mathematics – II | | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 3 | G106 | Physics – II | 105 | 3 | 0 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 4 |
| 4 | G108 | Chemistry – II | 107 | 3 | 0 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 4 |
| 5 | G202 | Engineering Drawing – II | 201 | 1 | 0 | 3 | 50 | 0 | 0 | 0 | 50 | 0 | 100 | 3 |
| 6 | G204 | Workshop Practice – II | 203 | 1 | 0 | 3 | 0 | 0 | 0 | 50 | 50 | 0 | 100 | 3 |
| 7 | G206 | Engineering Mechanics | | 3 | 0 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 3 |
| 8 | G110 | NCC II / NSS II | | 0 | 0 | 2 | 0 | 0 | 0 | 25 | 25 | 0 | 50 | 1 |
| | | TOTAL | | 16 | 2 | 14 | 400 | 40 | 60 | 150 | 200 | 0 | 850 | 26 |

**SAMPLE PATH:** TERM - III

| Sl. No | Code | Course | Pre-requisite | Study Scheme | | | Evaluation Scheme | | | | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Contact Hour/Week | | | Theory | | | Practical | | | | |
| | | | | L | T | P | End Exam | Progressive Assessment | | End Exam | Progressive Assessment | | | |
| | | | | | | | | Class Test | Assign ment | | Sessio nal | Viva | | |
| 1 | G207 | Fundamentals of Electrical & Electronics Engg. | | 3 | 0 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 4 |
| 2 | G301 | (Soft Core I) Environmental Education | | 3 | 0 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 3 |
| 3 | G302 | Soft Core II | | 3 | 0 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 3 |
| 4 | CE401 | Building Material | | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 5 | CE402 | Hydraulics | | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 6 | CE403 | CE Drawing – I | G201 & 202 | 0 | 0 | 4 | 0 | 0 | 0 | 50 | 50 | 0 | 100 | 2 |
| 7 | CE406 | Structural Mechanics | G205 | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| | | **TOTAL** | | 18 | 3 | 10 | 450 | 60 | 90 | 125 | 125 | 0 | 850 | 26 |

**SAMPLE PATH:** TERM - IV

| Sl. No | Code | Course | Pre-requisite | Contact Hour/Week | | | Theory | | | Practical | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | End Exam | Progressive Assessment | | End Exam | Progressive Assessment | | | |
| | | | | | | | | Class Test | Assignment | | Sessional | Viva | | |
| 1 | CE410 | Building Construction | CE401 | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 2 | CE404 | CE Drawing – II | CE403 | 0 | 0 | 4 | 0 | 0 | 0 | 50 | 50 | 0 | 100 | 2 |
| 3 | CE405 | Surveying – I | | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 4 | CE408 | Theory of Structure | CE406 | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 5 | CE407 | Geotechnical Engg I | | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 6 | CE507 | Design & Detailing of Structure – I | CE406 | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 7 | CE503 | Water Resource Engg | CE402 | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| | | **TOTAL** | | **18** | **6** | **10** | **450** | **60** | **90** | **125** | **125** | **0** | **850** | **29** |

**SAMPLE PATH:** TERM - V

| Sl. No | Code | Course | Pre-requisite | Contact Hour/Week | | | End Exam | Class Test | Assign ment | End Exam | Sessio nal | Viva | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | | | | | | | |
| 1 | CE501 | Highway & Transportation Engg. | | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 2 | CE504 | Estimating – I | | 2 | 2 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 3 | CE508 | Concrete  Technology | CE401 | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 4 | CE509 | Design of Structure – II | CE406 | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 5 | CE409 | Water & Waste Water Engg. | CE402 | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| 6 | CE506 | Surveying – II | CE405 | 3 | 1 | 2 | 75 | 10 | 15 | 25 | 25 | 0 | 150 | 5 |
| | | **TOTAL** | | **17** | **7** | **10** | **450** | **60** | **90** | **125** | **125** | **0** | **850** | **29** |

*(Headers: Study Scheme — Pre-requisite, Contact Hour/Week (L, T, P); Evaluation Scheme — Theory (End Exam, Progressive Assessment: Class Test, Assignment), Practical (End Exam, Progressive Assessment: Sessional, Viva); Total Marks; Credit)*

| Sl. No | Code | Course | Study Scheme | | | | Evaluation Scheme | | | | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Pre-requisite | Contact Hour/Week | | | Theory | | | Practical | | | | |
| | | | | L | T | P | End Exam | Progressive Assessment | | End Exam | Progressive Assessment | | | |
| | | | | | | | | Class Test | Assign ment | | Sessio nal | Viva | | |
| 1 | CE510 | Earthquake Resistant Design & Construction | CE408 & 509 | 3 | 0 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 3 |
| 2 | CE505 | Estimating – II | CE504 | 2 | 2 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 3 | CE502 | Geotechnical Engineering II | | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 4 | CE601 | Elective – I | | 3 | 1 | 0 | 75 | 10 | 15 | 0 | 0 | 0 | 100 | 4 |
| 5 | CE602 | Elective – II | | 1 | 0 | 4 | 0 | 0 | 0 | 50 | 50 | 0 | 100 | 3 |
| 6 | CE511 | Technical Seminar | | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 50 | 50 | 100 | 2 |
| 7 | CE512 | Project | | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 100 | 50 | 150 | 4 |
| 8 | CE513 | Industrial Training (3 weeks OJT + 1 week orientation) | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 100 | 200 | 10 |
| | | **TOTAL** | | 12 | 4 | 18 | 300 | 40 | 60 | 50 | 300 | 200 | 950 | 34 |