# Detailed Syllabus for Diploma Courses in Civil Engineering (Draft) (NEP2020)

State Council for Technical Education, Assam

Under

Directorate of Technical Education, Assam

# Preface

This syllabus have been formed with an objective of Government of Assam to implement NEP 2020 in Higher Education with effect from the academic session 2024-25 in the State Polytechnic Institutes in order to respond to the requirements of fast-changing and knowledge-based Indian society.

The New Curriculum has been designed to better meet the needs of the industry considering evolving technological trends and implications for the engineering workforce. This curriculum is also expected to enhance employability skills in the very process of teaching-learning, develop well trained Diploma Engineers who have the knowledge and the skills to engineering solutions for real-world problems.

Salient features that are considered for developing the curriculum aligned to NEP 2020 are as follows:

- Reduced number of credits.
- Introduction of Student Induction Program.
- Well defined learning objectives & outcomes for each course.
- Inclusion of courses on socially relevant topics.
- Built-in flexibility to the students in terms of professional elective and open Elective courses.
- Mandatory internship to equip the students with practical knowledge and provide them exposure to real time industrial environments.
- Mapping of Courses to its equivalent NPTEL/SWAYAM/Infosys/TATA Courses.
- Course on 'Entrepreneurship and Startups' to encourage entrepreneurial mindset.
- Introduction of Design Thinking and Universal Human Value course.

1 **Basic Guidelines:**

- An academic year is divided into two semesters as per AICTE guidelines.
- A semester consists of approximately 90 working days. One working week will have approximately 40 hours of instructional time.
- There shall also be a Winter Internship Program for duration of 4 weeks/one month.
- Internship/apprenticeship can be carried out during the winter term, mandatorily for regular student.
- Students, who wish to exit after 1st year or 2nd year of study, have to undergo mandatory skill courses as specified by the respective department/SCTE.

**2. Induction Program**

Three week mandatory induction program with the following activities is proposed in this new syllabus**.**Induction program for students is to be offered right at the start of the first year.

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

**3. Mandatory Visits/ Workshop/Expert Lectures:**

A. It is mandatory to arrange one industrial visit every semester for the students of each branch.

B. It is mandatory to conduct a One-week workshop during the fifth semester on professional/ industry/ entrepreneurial orientation.

C. It is mandatory to organize at least one expert lecture per semester for each branch by inviting resource persons from domain specific industry.

**4. Evaluation Scheme**

A. **For Theory Courses:**

The weightage of internal assessment is 40% and for End Semester Exam is 60%. The student has to obtain at least 40% marks individually both in Internal Assessment (IA)and end semester exams to pass.

B. **For Practical Courses:**

The weightage of internal assessment is 60% and for End Semester Exam is 40%. The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

**C. For Summer Internship / Projects / Seminar etc.**

Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

**Note:** The internal assessment is based on the student's performance in class tests (Average of best two out of three tests), quizzes, assignments, class performance, attendance, viva-voce in practical, lab record etc.

**5. Mapping of Marks to Grades**

Each course (Theory/Practical) is to be assigned 100 marks, irrespective of the number of credits, and the mapping of marks to grades may be done as per the following table:

| Range of Marks | Assigned Grade |
|---|---|
| **91-100** | **$A^+$** |
| **81-90** | **A** |
| **71-80** | **$B^+$** |
| **61-70** | **B** |
| **51-60** | **$C^+$** |
| **46-50** | **C** |
| **40-45** | **D** |
| **< 40** | **F (Fail due to less Marks)** |
| **___** | $F^R$ (Fail due to shortage of attendance and therefore, to repeat the course) |

**6. General Course Structure & Credit Distribution (Diploma Program)**

**A. Definition of Credit**:

| | |
|---|---|
| 1 Hr. Lecture (L) per week | 1 Credit |
| 1 Hr. Tutorial (T) per week | 1 Credit |
| 1 Hr. Practical (P) per week | 0.5 Credit |
| 2 Hours Practical (P) per week | 1 Credit |

**B. Range of Credits: T**he total number of credits proposed for the Three years Diploma in Civil Engineering iskept 120.

**C. Structure of Diploma Program:** The structure of Diploma program shall have essentially the following categories of courses with the breakup of credits as given:

| S.No. | Category | Credit Breakup |
|---|---|---|
| 1 | Humanities and Social Sciences including Management courses | 7 |
| 2 | Basic Science courses | 19 |
| 3 | Engineering Science courses including workshop, drawing, basics of | 17 |

| | | |
|---|---|---|
| | electronics/electrical/ mechanical/ computer etc. | |
| 4 | Program Core Courses | 49 |
| 5 | Program Elective course relevant to chosen specialization/branch | 7 |
| 6 | Open Elective – Electives from other technical and /or emerging Subjects | 8 |
| 7 | Project work, seminar and internship in industry or elsewhere | 13 |
| 8 | Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition] | (Non-credit) |
| | **Total** | **120** |

**D. Course code and definition:**

| Course Code | Definitions | Course Code | Definitions |
|---|---|---|---|
| L | Lecture | CEPC | Civil Engg -Program core courses |
| T | Tutorial | CEPE | Civil Engg-Program Elective course |
| P | Practical | OE | Open Elective courses |
| C | Credits | AU | Mandatory Audit courses |
| BS | Basic Science Courses | SC | Skill Courses |
| ES | Engineering Science Courses | SI | Internship |
| HS | Humanities and Social Sciences includingManagement courses | | |

E. **Course level coding scheme:**

Three-digit number (odd numbers are for the odd semester courses and even numbers arefor even semester courses) used as suffix with the Course Code for identifying the level of thecourse e.g.

101, 102 … etc. for first Semester
201, 202 …. Etc. for second Semester
301, 302 … for third Semester and so on.

**E. Category-wise Courses**

**A) HUMANITIES & SOCIAL SCIENCES COURSES [HS]**

(i) Number of Humanities & Social Sciences Courses: 4
(ii) Credits: 7

| Sl. No | Code No. | Course Title | Hours per week | | | Semester | Credits |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| 1. | HS-101 | Communication Skills in English | 2 | 0 | 0 | I | 2 |
| 2. | HS-105 | Communication Skills in English Lab | 0 | 0 | 2 | I | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3. | HS-103 | Sports and Yoga | 0 | 0 | 2 | I | 1 |
| 4. | HS-601 | Entrepreneurship &Start-up | 3 | 0 | 0 | VI | 3 |
| Total credits | | | | | | | 7 |

**B) BASIC SCIENCES COURSE [BS]**

(i) Number of **Basic Sciences Courses**: 8
(ii) Credits: 19

| Sl. No | Code No. | Course Title | Hours per week | | | Semester | Credits |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| 1. | BS-101 | Mathematics-I | 2 | 1 | 0 | I | 3 |
| 2. | BS-102 | Applied Physics-I | 2 | 1 | 0 | I | 3 |
| 3. | BS-105 | Applied Chemistry | 2 | 1 | 0 | I | 3 |
| 4. | BS-107 | Applied Physics-I Lab | 0 | 0 | 2 | I | 1 |
| 5. | BS-109 | Applied Chemistry Lab | 0 | 0 | 2 | I | 1 |
| 6. | BS-201 | Mathematics-II | 3 | 1 | 0 | II | 4 |
| 7. | BS-202 | Applied Physics-II | 2 | 1 | 0 | II | 3 |
| 8. | BS-207 | Applied Physics-II Lab | 0 | 0 | 2 | II | 1 |
| **Total credits** | | | | | | | **19** |

**C) ENGINEERING SCIENCE COURSES [ES]**

(i) Number of **Engineering Sciences Courses**: 8
(ii) Credits: 17

| Sl. No | Code No. | Course Title | Hours per week | | | Semester | Credits |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| 1. | ES-101 | Engineering Graphics | 0 | 0 | 4 | I | 2 |
| 2. | ES-103 | Engineering Workshop Practice | 0 | 0 | 6 | I | 3 |
| 3. | ES-202 | Introduction to IT Systems | 2 | 0 | 0 | II | 2 |
| 4. | ES-204 | Fundamentals of Electrical and ElectronicsEngineering | 2 | 1 | 0 | II | 3 |
| 5. | ES-206 | Engineering Mechanics | 2 | 1 | 0 | II | 3 |
| 6. | ES-206 | Introduction to IT Systems lab | 0 | 0 | 4 | II | 2 |
| 7. | ES-209 | Fundamentals of Electrical and Electronics Engineering lab | 0 | 0 | 2 | II | 1 |
| 8. | ES-210 | Engineering Mechanics lab | 0 | 0 | 2 | II | 1 |
| **Total credits** | | | | | | | **17** |

**D) AUDIT COURSES [AU]**

**Note:**

(i) Number of **Audit Courses**: 3

(ii) Credits: 0

| Sl. No | Code No. | Course Title | Hours per week | | | Semester | Credits |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| 1. | AU-201 | Environmental Science | 2 | 0 | 0 | II | 0 |
| 2. | AU-301 | Essence of Indian Knowledge and Tradition | 2 | 0 | 0 | III | 0 |
| 3. | AU-501 | Indian Constitution | 2 | 0 | 0 | V | 0 |
| Total credits | | | | | | | 0 |

**E) PROGRAM CORE COURSE (CEPC)**

**Note:**

(i) Number of Program core course: 24

(ii) Credits: 49

| Sl. No | Code No. | Course Title | Hours per week | | | Semester | Credits |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| 1. | CEPC-301 | Building Material and Construction | 3 | 0 | 0 | III | 3 |
| 2. | CEPC-302 | Basic Surveying | 3 | 0 | 0 | III | 3 |
| 3. | CEPC-303 | Structural Mechanics-I | 3 | 0 | 0 | III | 3 |
| 4. | CEPC-304 | Building Planning and Drawing | 0 | 0 | 4 | III | 2 |
| 5. | CEPC-305 | Auto-CAD & 3D modelling | 0 | 0 | 4 | III | 2 |
| 6. | CEPC-306 | Water Resource Engineering | 3 | 0 | 0 | III | 3 |
| 7. | CEPC-307 | Building Material and Construction Lab | 0 | 0 | 2 | III | 1 |
| 8. | CEPC-308 | Basic Surveying Lab | 0 | 0 | 2 | III | 1 |
| 9. | CEPC-401 | Hydraulics | 2 | 0 | 0 | IV | 2 |
| 10. | CEPC-402 | Estimating, Costing and valuation | 3 | 0 | 0 | IV | 3 |
| 11. | CEPC-403 | Structural Mechanics-II | 2 | 0 | 0 | IV | 2 |
| 12. | CEPC-404 | Concrete Technology | 3 | 0 | 0 | IV | 3 |
| 13. | CEPC-405 | Hydraulics Lab | 0 | 0 | 2 | IV | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 14. | CEPC-406 | Concrete Technology Lab | 0 | 0 | 2 | IV | 1 |
| 15. | CEPC-501 | Geotechnical Engineering | 3 | 0 | 0 | V | 3 |
| 16. | CEPC-502 | Design of RCC structure | 2 | 1 | 0 | V | 3 |
| 17. | CEPC-503 | Environmental Engineering | 2 | 0 | 0 | V | 2 |
| 18. | CEPC-504 | Transportation Engineering | 2 | 0 | 0 | V | 2 |
| 19. | CEPC-505 | Geotechnical Engineering Lab | 0 | 0 | 2 | V | 1 |
| 20. | CEPC-506 | Environmental Engineering Lab | 0 | 0 | 2 | V | 1 |
| 21. | CEPC-507 | Transportation Engineering Lab | 0 | 0 | 2 | V | 1 |
| 22. | CEPC-601 | Advanced Surveying | 3 | 0 | 0 | VI | 3 |
| 23. | CEPC-602 | Design of Steel Structures | 2 | 0 | 0 | VI | 2 |
| 24. | CEPC-603 | Advanced Surveying Lab | 0 | 0 | 2 | VI | 1 |
| **Total credits** | | | | | | | **49** |

**F) PROGRAM ELECTIVE COURSE (CEPE)**

**Note:**
(i) Number of Program Elective course: 3 (To be selected one course from the track)
(ii) Credits: 7

| Sl. No | Code No. | Course Title | Hours per week | | | Semester | Credits |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| 1. | CEPE-401 | Rural Construction Technology | 2 | 0 | 0 | IV | 2 |
| | CEPE-402 | Precast and Prestressed Concrete | | | | | |
| | CEPE-403 | Construction Management | | | | | |
| 2. | CEPE-501 | Transportation Engg-II (RTE) | 3 | 0 | 0 | V | 3 |
| | CEPE-502 | Advanced Construction Technology | | | | | |
| | CEPE-503 | Green Building and Energy Conservation | | | | | |
| 3. | CEPE-601 | Interior Design and Practices | 2 | 0 | 0 | VI | 2 |
| | CEPE-602 | Pavement Design & maintenance | | | | | |
| | CEPE-603 | Repairs and Maintenance of Structures | | | | | |
| **Total credits** | | | | | | | **7** |

**G) OPEN ELECTIVE COURSE (OE)**

**Note:**
(i) Number of Open Elective course: 4 (To be selected one course from the track)
(ii) Credits: 8

| Sl. No | Code No. | Course Title | Hours per week | | | Semester | Credits |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| 1. | OE-301 | Engineering Economics and Accountancy | 2 | 0 | 0 | III | 2 |
| | OE-302 | Environmental Pollution & Control | | | | | |
| | OE-303 | Solid Waste Management | | | | | |
| | OE-304 | Design Thinking & Developing Innovative Ideas ( Infosys springboard) | | | | | |
| | OE-305 | Innovation, Design Thinking and prototyping ( Tata Technologies) | | | | | |
| | OE-306 | Any other course from other program approved by SCTE, Assam | | | | | |
| 2. | OE-401 | Next generation Technologies (Infosys Springboard) | 2 | 0 | 0 | IV | 2 |
| | OE-402 | Advanced plumbing (TATA Technologies) | | | | | |
| | OE-403 | Disaster Management | | | | | |
| | OE-404 | Internet of Things (Tata Technologies) | | | | | |
| | OE-405 | Any other course from other program approved by SCTE, Assam | | | | | |
| 3. | OE-501 | Entrepreneurship: Laying foundation and Preparing for launch (Infosys Springboard) | 2 | 0 | 0 | V | 2 |
| | OE-502 | Product Verification & Analysis (Tata Technologies) | | | | | |
| | OE-503 | Risk Management Practices in Construction | | | | | |
| | OE-504 | Advanced Welding and painting (Tata Technologies) | | | | | |
| | OE-505 | Any other course from other program approved by SCTE, Assam | | | | | |
| 4. | OE-601 | Fundamental of GIS (Infosys Springboard) | 2 | 0 | 0 | VI | 2 |
| | OE-602 | Industrial Robotics (Tata Technologies) | | | | | |
| | OE-603 | Automation & Robotics in Civil Engineering | | | | | |
| | OE-604 | Tendering and Accounts | | | | | |
| | OE-605 | Any other course from other program approved by SCTE, Assam | | | | | |
| | | | | | | | |
| **Total credits** | | | | | | | **8** |

**H) PROJECT/INTERNSHIP/SEMINAR:**

**Note:**
(i) Number of course: 6
(ii) Credits: 13

**BREAK UP OF INTERNAL ASSESSMENT MARKS**

**A) Internal Assessment for Theory (TA+HA&CT)**

| Component | **Teacher's Assessment (TA)** | | | **Home Assignment & Class Test (HA&CT)** | | | | **Total** |
|---|---|---|---|---|---|---|---|---|
| | Attendance | Discipline | Class Participation | Assignment | Presentation / Seminar | Quiz | Class Test | |
| Maximum Marks | 5 | 1 | 2 | 4 | 6 | 2 | 20 | 40 |
| **Note**: Three (3) class tests must be conducted for each course. For calculation of Internal Assessment, average of best two (2) class tests out of the three (3) conducted is to be considered. | | | | | | | | |

**B) Internal Assessment for Practical (PA)**

| **Component** | **Maximum Marks** |
|---|---|
| **Teacher's Assessment (TA)** | |
| Attendance | 10 |
| Discipline | 2 |
| **Practical Assignment** | |
| Practical Work and/or Laboratory Report | 30 |
| Presentation | 10 |
| Viva | 8 |
| **Total** | **60** |

c) Grading System proposed is Absolute Grading System.

d) Conversion factor from Cumulative Grade Point Average (CGPA) to Percentage (%) is 10.

# COURSE STRUCTURE

Credit distribution & Marks

THIRD SEMESTER

| Sl. No | **Category of Course** | Code No. | Course Title | Hours per week | | | Credits | Marks |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | Program core course | CEPC-301 | Building Material and Construction | 3 | 0 | 0 | 3 | 100 |
| 2. | Program core course | CEPC-302 | Basic Surveying | 3 | 0 | 0 | 3 | 100 |
| 3. | Program core course | CEPC-303 | Structural Mechanics-I | 3 | 0 | 0 | 3 | 100 |
| 4. | Program core course | CEPC-304 | Building Planning and Drawing | 0 | 0 | 4 | 2 | 150 |
| 5. | Program core course | CEPC-305 | Auto-CAD & 3D modeling | 0 | 0 | 4 | 2 | 100 |
| 6. | Program core course | CEPC-306 | Water Resource Engineering | 3 | 0 | 0 | 3 | 100 |
| 7. | Program core course | CEPC-307 | Building Material and Construction Lab | 0 | 0 | 2 | 1 | 100 |
| 8. | Program core course | CEPC-308 | Basic Surveying Lab | 0 | 0 | 2 | 1 | 150 |
| 9. | Open Elective | OE-### | *Open Elective-I | 2 | 0 | 0 | 2 | 100 |
| 10. | Audit | AU-301 | Essence of Indian Knowledge and Tradition | 2 | 0 | 0 | 0 | -- |
| | Total Credits | | | | | | **20** | **1000** |

| *Open Elective-I Courses (Any one to be selected) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. | Open Elective | OE-301 | Engineering Economics and Accountancy | 2 | 0 | 0 | 2 | 100 |
| 2. | Open Elective | OE-302 | Environmental Pollution & Control | 2 | 0 | 0 | 2 | 100 |
| 3. | Open Elective | OE-303 | Solid Waste Management | 2 | 0 | 0 | 2 | 100 |
| 4. | Open Elective | OE-304 | Design Thinking & Developing Innovative Ideas ( Infosys springboard) | 2 | 0 | 0 | 2 | 100 |
| 5. | Open Elective | OE-305 | Innovation, Design Thinking and prototyping (Tata Technologies) | 2 | 0 | 0 | 2 | 100 |
| 6. | Open Elective | OE-306 | Any other course from other program approved by SCTE, Assam | 2 | 0 | 0 | 2 | 100 |
| | | | | | | | | |

***Note: Mandatory Internship (4 weeks) after Third semester. Credits will be added in Fourth semester.***

# MARKS DISTRIBUTION

## Third Semester

| Sl. No | Course Code | Course Title | Theory | | | | Practical | | | | Total Marks (Course) | Pass marks (Course) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | IA | | ESE | | IA | | ESE | | | |
| | | | Total Marks | Pass Marks | Total Marks | Pass Marks | Total Marks | Pass Marks | Total Marks | Pass Marks | | |
| 1. | CEPC-301 | Building Material and Construction | 40 | 16 | 60 | 24 | - | - | - | - | 100 | 40 |
| 2. | CEPC-302 | Basic Surveying | 40 | 16 | 60 | 24 | - | - | - | - | 100 | 40 |
| 3. | CEPC-303 | Structural Mechanics-I | 40 | 16 | 60 | 24 | - | - | - | - | 100 | 40 |
| 4. | CEPC-304 | Building Planning and Drawing | - | - | - | - | 90 | 36 | 60 | 24 | 150 | 60 |
| 5. | CEPC-305 | Auto-CAD & 3D modeling | - | - | - | - | 60 | 24 | 40 | 16 | 100 | 40 |
| 6. | CEPC-306 | Water Resource Engineering | 40 | 16 | 60 | 24 | - | - | - | - | 100 | 40 |
| 7. | CEPC-307 | Building Material and Construction Lab | - | - | - | - | 60 | 24 | 40 | 16 | 100 | 40 |
| 8. | CEPC-308 | Basic Surveying Lab | - | - | - | - | 90 | 36 | 60 | 24 | 150 | 60 |
| 9. | ### | *Open Elective-I | 40 | 16 | 60 | 24 | - | - | - | - | 100 | 40 |
| 10. | AU-301 | Essence of Indian Knowledge and Tradition | - | - | 100 | 40 | - | - | - | - | - | - |

# DETAILED SYLLABUS

**Semester-III**

## 1. COURSE TITLE:: BUILDING MATERIAL AND CONSTRUCTION

| | | |
|---|---|---|
| Course Title | : | **BUILDING MATERIAL AND CONSTRUCTION** |
| Course Code | : | CEPC301 |
| Semester | : | Third |
| Number of Credits | : | 3 [L-3, T-0, P-0] |
| Prerequisites | : | NIL |
| Course Category | : | Program core course |

**LEARNING OBJECTIVES**:

| | | |
|---|---|---|
| LO1 | : | Explain Requirements of good building stone and bricks |
| LO2 | : | Identify Zoning of sand, fineness modulus of sand and bulking of sand |
| LO3 | : | Different uses and characteristics of timber. |
| LO4 | : | Describe Various methods of painting. |
| LO5 | : | Explain different types of foundation |

**COURSE OUTCOME**: After the end of the course, students will be able to:

| | | |
|---|---|---|
| CO1 | : | Explain the properties and requirements of all building materials |
| CO2 | : | Propose suitable type of foundation for building structures |
| CO3 | : | Select suitable type of masonry for building structures. |
| CO4 | : | Identify various components of buildings and explain their functions |
| CO5 | : | Apply procedures for execution of various constructions activities |

**TEACHING SCHEME**: (in hours/week)

| **Theory** | | | **Practical (credit)** |
|---|---|---|---|
| Lecture | Tutorial | Total credits | |
| 3 | 0 | 3 | 0 |

**TEACHING SCHEME**: (Total hours)

| **Theory** | | | **Practical** |
|---|---|---|---|
| Lecture | Tutorial | **Total** | |
| 45 | 0 | 45 | 0 |

**EXAMINATION SCHEME**:

| Theory | | | | Practical | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| ESE | | IA | | ESE | | IA | | |
| Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | 100 |
| 60 | 24 | 40 | 16 | -- | -- | -- | -- | |

**DETAILED COURSE CONTENT:**

| Unit | Chapter Title | Contents | Hours |
|---|---|---|---|
| 1 | Introduction | **1.1** Different types of materials used in construction<br>**1.2** Selection of materials for different Civil Engineering structures on the basis of strength, durability, Eco friendly and economy. | 2 |
| 2 | Stone & Bricks | **2.1** Requirements of good building stone; Significance of various test on stones and their BIS recommendations, Uses of stones.<br>**2.2** Composition of good brick earth, Classification of bricks; Properties of first class brick; Conventional bricks; Standard bricks; Special bricks- fire clay brick, refractory brick, hollow blocks, fly ash bricks,<br>AAC block. Significance of various field and laboratory tests on brick and AAC Block with their BIS recommendations | 5 |
| 3 | Sand & Mortar | **3.1** Functions of sand in mortar and concrete, Characteristics of good sand for mortar and concrete work; Grading of fine aggregates, Zoning of sand; fineness modulus of sand , bulking of sand, Effect of bulking of sand in volumetric proportion of mortar and concrete<br>**3.2** Cement–sand –mortar; usual proportions and specific uses; | 4 |
| 4 | Timber & Miscellaneous materials | **4.1** Use of timber, characteristics of good timber, plywood, particle board, veneer, sun mica, artificial timber, rubber wood.<br>**4.2** Use and brief introduction of Steel, Glass, Aluminum, PVC, CPVC, Waterproofing and Termite proofing materials, Bonding agents, Epoxy resins, Polishing materials etc. related to Civil Engineering construction.<br>**4.3** Object and use of false ceiling, materials for false ceiling, methods of providing false ceiling. | 6 |
| 5 | Painting & Varnishing | **5.1** Object and characteristics of good paint, composition of oil bound paint bases, vehicle, filler, solvent & pigment.<br>**5.2** Object and uses of Varnishing,<br>**5.3** Objects and method of white washing | 4 |
| 6 | Foundation | **6.1** Site clearance, preparing job layout, layout of structure by center line and face line method<br>**6.2** Excavation for foundation, timbering and strutting.<br>**6.3** Definitions and purpose of foundation, Essential requirements of foundations; Type of foundation-deep foundations and shallow foundations and their classifications. | 5 |

| | | | |
|---|---|---|---|
| 7 | Masonry | **7.1** Definition, technical terms used in brick masonry, General principles to be observed in brick masonry and AAC block, Bonds, different types of bonds, their uses at specific locations<br>**7.2** Hollow concrete block Masonry, , Cavity wall- purpose and construction<br>**7.3** Definition and types of scaffolding, object of scaffolding | 3 |
| 8 | Building Communication and Ventilation | **8.1** Functions, locations, sizes of doors ; Classification of doors (description with sketches) and their uses at specific locations<br>**8.2** Functions, locations, Sizes of windows; Classification of windows (description with sketches) and their uses at specific locations.<br>**8.3** Stair Case, Ramps, Lift, Elevators and Escalators. Terms used in staircase, Types of staircase | 4 |
| 9 | Damp proofing and floors | **9.1** Definition of dampness, sources of dampness, effects of dampness<br>**9.2** Methods used for prevention of dampness<br>**9.3** Materials used for damp proofing<br>**9.4** Damp proof course used for basement and at plinth, damp proofing of roofs<br>**9.5** Ground floor-definition, different types of ground floors (name),description of concrete flooring, marble flooring | 6 |
| 10 | Building Finishes | Floors and Roofs: Types of Floor Finishes and its suitability-Kota, Marble, Granite, Ceramic Tiles, Vitrified, Chequered Tiles, Paver Blocks, Concrete Floors, wooden Flooring, Skirting and Dado. Process of Laying and Construction, Finishing and Polishing of Floors,<br>Roofing Materials-RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre<br>Sheets.<br>Types of Roof: Flat roof, Pitched Roof-King Post truss, Queen Post Truss, terms used in roofs.<br>**10.1** Plastering – necessity of plastering, single coat plaster double coat plaster, special plasters, stucco plaster, Plaster board and wall claddings. Precautions to be taken in plastering, defects in plastering.<br>**10.2** Pointing – Necessity, Types of pointing and procedure of Pointing.<br>Painting –Necessity, Surface Preparation for painting, Methods of Application. | 6 |
| **Total contact hours** | | | **45** |

| Table of Specification | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | Allotted Hours | Objective | | | Short Answer Type | | | | Long Answers Type | | | | | | Total Marks |
| | | R | U | AP | R | U | AP | AN | R | U | AP | AN | E | C | |
| 1 | 2 | 1 | | | | | | | | | | | | | 1 |
| 2 | 5 | | | 1 | | 1 | | | 2 | | 3 | | | | 7 |
| 3 | 4 | 1 | | 1 | | | 2 | | | 3 | | | | | 7 |
| 4 | 6 | 1 | 1 | | 1 | 2 | | | | 3 | | | | | 8 |
| 5 | 4 | 1 | | 1 | | 1 | | | | | 4 | | | | 7 |
| 6 | 5 | 1 | 1 | | 2 | 1 | | | 3 | | | | | | 8 |
| 7 | 3 | | 1 | | 1 | | | | | 4 | | | | | 6 |
| 8 | 4 | | 1 | | | 2 | | | 3 | | | | | | 6 |
| 9 | 6 | 1 | | | 1 | | | | | | 3 | | | | 5 |
| 10 | 6 | | 1 | 1 | | 1 | | | 2 | | | | | | 5 |
| Total | 45 | 6 | 5 | 4 | 5 | 8 | 2 | | 10 | 10 | 10 | | | | 60 |
| **Total Marks** | | **15** | | | **15** | | | | **30** | | | | | | **60** |

**NB:R:** Remember, **U:** Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

**REFERENCE BOOK LIST:**

| Sl No. | Book Name | Author Name | Publishing House, Volume, ISBN |
|---|---|---|---|
| 1 | Construction Materials | D.N.Ghosh | Tata McGraw-Hill |
| 2 | Building materials | AmarjitAgrawal | New India Publication |
| 3 | Building materials | S. K. Duggal | New Age International |
| 4 | Engineering materials | C.P. Sarma | PHI Publication |
| 5 | Building Construction | S. P. Arora and Bindra | DhanpatRai Publication |
| 6 | Building Construction | S. C. Rangawala | Charotar Publication |
| 7 | Building Construction | Sushil Kumar | Standard Publication |
| 8 | Building Materials & Construction | Saurabh Kr Soni | S K Kataria& Sons |

# 2. COURSE TITLE:: BASIC SURVEYING

| **COURSE TITLE** | **:** | **BASIC SURVEYING** |
|---|---|---|
| Course Code | : | CEPC-302 |
| Semester | : | Third |
| Number of Credits | : | 3 [L:3, T:0, P:0] |
| Prerequisites | : | Student should have knowledge in Engineering drawing |
| Course Category | : | Program Core Course |

**LEARNING OBJECTIVES:**

| | | |
|---|---|---|
| LO1 | : | To understandtypes of surveying. |
| LO2 | : | To know various methods and equipments to be used in different surveys. |
| LO3 | : | To know the use and operational details of surveying equipments. |
| LO4 | : | To know the preparation of map from the field data |

**COURSE OUTCOME**: After the end of the course, students will be able to:

| | | |
|---|---|---|
| CO1 | : | Identify the type of survey required for a given situation. |
| CO2 | : | Prepare a map and compute area using chain, tape. |
| CO3 | : | Conduct traversing in the field using chain and compass. |
| CO4 | : | Determine reduced level using levelling instruments. |
| CO5 | : | Prepare contour maps and calculatearea and volume. |

**TEACHING SCHEME**: (in hours/week)

| **Theory** | | | **Practical** | |
|---|---|---|---|---|
| Lecture | Tutorial | Total credits | Practical | credits |
| 3 | 0 | 3 | 0 | 0 |

**TEACHING SCHEME**: (in hours)

| **Theory** | | | **Practical** |
|---|---|---|---|
| Lecture | Tutorial | Total | --- |
| 45 hrs | 0 hrs | 45 | --- |

**EXAMINATION SCHEME**:

| Theory | | | | Practical | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| ESE | | IA | | ESE | | IA | | |
| Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | 100 |
| 60 | 24 | 40 | 16 | --- | --- | --- | --- | |

**DETAILED COURSE CONTENT:**

| Unit | Chapter Title | Contents | Hours |
|---|---|---|---|
| 1 | Introduction and overview | • Definition and objective of survey<br>• Principle of surveying<br>• Main division of surveying<br>• General classification of surveys<br>• Work of a surveyor. | 2 |
| 2 | Measurement of distance | • Measurement of distance by chain and tape.<br>• Different Types of chain (BRIEF IDEA ONLY)<br>• Instrument for chaining.<br>• Ranging and chaining on sloping ground.. | 4 |
| 3 | Chain Survey | • Basic concept, Chainage, survey stations, Survey lines, tie line base line, checks line.<br>• Offset for locating details- Perpendicular and Oblique offset<br>• Methods of Chaining, obstacles in chaining.<br>• Field book entries and plotting the field records. | 6 |
| 4 | Compass Survey | • Basic concepts of compass surveying<br>• Compass Traversing- open, closed.<br>• Whole Circle Bearing and Reduced Bearing, conversion of WCB to RB or vice versa.<br>• Fore Bearing and Back Bearing, Calculation of internal and external angles from bearings at a station, numerical problems.<br>• Error due to local attraction and correction applied.<br>• Closing error and adjustment of closing error. | 10 |
| 5 | Levelling | • Basic terminologies: Level surfaces, Horizontal and vertical surfaces, Datum, Bench Marks- GTS, Permanent, Arbitrary and Temporary, Reduced Level, Rise, Fall, Line of collimation, Station, Back sight, Fore sight, Intermediate sight, Change point, Height of instruments.<br>• Types of levels: Dumpy, Auto level, Digital level,<br>• Components of Dumpy Level and its fundamental axes,<br>• Temporary adjustments of Level.<br>• Types of Leveling Staff: Self-reading staff and Target staff.<br>• Calculation of reduced level by Rise and Fall & H.I method<br>• Different methods of leveling-<br>a) Fly leveling<br>b) Profile leveling<br>c) Cross sectioning<br>d) Reciprocal leveling<br>• Effects of curvature, refraction | 15 |
| 6 | Contouring | • Contour and contouring, contour interval and horizontal equivalent. | |

| | | | |
|---|---|---|---|
| | | • Characteristics and uses of contours.<br>• Indirect method of contouring & interpolation of contour.<br>• Preparation of contour map.<br>• Measurement of volume from contour map. | 8 |
| **Total Contact Hours** | | | 45 |

**DISTRIBUTION OF MARKS**

| **Table of Specification** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | Allotted Hours | Objective | | | Short Answer Type | | | | Long Answers Type | | | | | | Total Marks |
| | | R | U | AP | R | U | AP | AN | R | U | AP | AN | E | C | |
| 1 | 2 | 1 | 1 | - | 2 | - | - | - | - | - | - | - | - | - | 4 |
| 2 | 4 | 1 | 1 | 1 | 1 | 1 | - | - | - | | 2 | - | - | - | 7 |
| 3 | 6 | 1 | - | 1 | - | 1 | 1 | - | - | | 3 | 1 | - | - | 8 |
| 4 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | | 4 | 1 | 4 | - | 15 |
| 5 | 15 | 1 | 1 | 1 | - | 3 | 1 | - | - | | 4 | 3 | 4 | - | 18 |
| 6 | 8 | 1 | - | 1 | - | 1 | 1 | - | - | | 3 | 1 | - | - | 8 |
| Total | 45 | 6 | 4 | 5 | 4 | 7 | 4 | - | - | - | 16 | 6 | 8 | - | 60 |
| **Total Marks** | | **15** | | | **15** | | | | **30** | | | | | | **60** |

**NB: R:** Remember, **U:** Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

**REFERENCE BOOK LIST:**


| **Sl No.** | **Book Name** | **Author Name** | **Publishing House, Volume, ISBN** |
|---|---|---|---|
| 1 | Surveying and Levelling, | Basak, N. N., | McGraw Hill Education, New Delhi. |
| 2 | Textbook of Surveying, | Kochher, C.L, | DhanpatRai Publication. New Delhi. |
| 3 | Surveying and Levelling volume I, | Kanetkar, T. P.; Kulkarni, S. V., | Pune VidyarthiGruhPrakashan. |
| 4 | Surveying I, | Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, | Laxmi Publications, New Del hi. |
| 5 | Survey I, | Duggal, S. K., | McGraw Hill Education, New Delhi. |
| 6 | Surveying and Levelling, Volume 1, | Bhavikatti, S. S., | I. K. International, New Delhi. |
| 7 | Surveying, | Saikia, M D.; Das. B.M.; Das. M.M., | PHI Learning, New Delhi. |

## 3. COURSE TITLE:: STRUCTURAL MECHANICS-I

| | | |
|---|---|---|
| Course Title | : | **Structural Mechanics-I** |
| Course Code | : | CEPC - 303 |
| Semester | : | Third |
| Number of Credits | : | 3 [L:3, T:0, P:0] |
| Prerequisites | : | Engineering Mechanics |
| Course Category | : | Program core course |

**LEARNING OBJECTIVES:**

| | | |
|---|---|---|
| LO1 | : | To calculate the stress and strain in simple members. |
| LO2 | : | To apply the relations between elastic constants in problem solving |
| LO3 | : | To compute and plot shear force and bending moment at various sections of beam. |
| LO4 | : | To calculate the bending stresses in beam. |

**COURSE OUTCOME:** After the end of the course, students will be able to:

| | | |
|---|---|---|
| CO1 | : | Understand the conceptof simple stress and strain. |
| CO2 | : | Apply the concept of elastic constants for analysis of structures. |
| CO3 | : | Analyse bendingmoments and shear force anddraw SFD and BMD |
| CO4 | : | Identify the bending stressdeveloped in beams due toforces applied. |

**TEACHING SCHEME**: (in hours/week)

| Theory | | | Practical (credit) |
|---|---|---|---|
| Lecture | Tutorial | Total credits | |
| 3 | 0 | 3 | 0 |

**TEACHING SCHEME:**(in hours)

| **Theory** | | | **Practical** |
|---|---|---|---|
| Lecture | Tutorial | Total | |
| 45 | 0 | 45 | 0 |

**EXAMINATION SCHEME:**

| Theory | | | | Practical | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| ESE | | IA | | ESE | | IA | | |
| Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | **100** |
| 60 | 24 | 40 | 16 | -- | -- | -- | -- | |

**DETAILED COURSE CONTENT:**

| Unit | Chapter Title | Contents | Hours |
|---|---|---|---|
| 1 | Simple stresses and strains | **1.1** Concept of rigid, elastic and plastic body, definition of stress and strain, Hook's law, elastic limit, modulus of elasticity, simple tension, simple compression, simple shear , simple problem.<br>**1.2** Standard stress strain curve for mild steel and its salient points.<br>**1.3** Deformation of body due to uniaxial force , due to axial forces applied at intermediate sections, deformation of body of varying (stepped) cross section due to axial load.<br>**1.4** Concept of composite section, conditions to have a section composite, stresses induced and load shared by material under axial loading | 12 |
| 2 | Elastic Constants | Longitudinal and lateral strain, Poisson's ratio, Bulk modulus, modulus of rigidity, Elastic constants and their relationship (no deduction is required), problems of calculation of elastic constant with only uniaxial loading case. | 7 |
| 3 | Shear force and bending moments | Types of beams and supports, types of loads, Definitions of shear force and bending moment and their sign conventions, SFD and BMD for udl and point load for<br>a. Simply supported beam and<br>b. Cantilever beam,<br>c. Overhanging beam<br>Location of maximum bending moment, Numerical problems related to the above topics | 15 |
| 4 | Bending stresses in beam | Concept and Theory of pure bending, Assumption in theory of simple bending, bending equation (derivation not required), bending stresses and their nature, bending stress distribution diagram for rectangular and symmetrical I section. Concept of moment of resistance, problem solving using bending equation. | 11 |
| Total Contact Hours | | | 45 |

**Table of Specification**

| Units | Allotted Hours | Objective | | | Short Answer Type | | | | Long Answers Type | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | R | U | AP | R | U | AP | AN | R | U | AP | AN | E | C | |
| 1 | 12 | 1 | 1 | 2 | 1 | 3 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 14 |
| 2 | 7 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 9 |
| 3 | 15 | 1 | 2 | 2 | 1 | 3 | 4 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 25 |
| 4 | 11 | 1 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 12 |
| Total | | 4 | 5 | 6 | 3 | 8 | 4 | 0 | 0 | 0 | 30 | | | | |
| **Total** | **45** | **15** | | | **15** | | | | **30** | | | | | | **60** |

**NB:R:** Remember, **U:** Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

**REFERENCE BOOK LIST:**

| Sl No. | Book Name | Author Name | Publishing House, Volume, ISBN |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 1 | Strength of materials | S. Ramamuratham&R.Narayan | DhanpatRai& Sons |
| 2 | Strength of materials | Dr. R.K. Bansal | Laxmi Publication (P) Ltd |
| 3 | Strength of materials | M. Chakraborty | S K Kataria& Sons |
| 4 | Structural Mechanics | A K Upadhyay | S K Kataria& Sons |
| 5 | Mechanics of Structures- vol I | S. B. Junnarkar | Charotar Publishing House,Anand |

# 4. COURSE TITLE:: BUILDING PLANNING AND DRAWING

| | | |
|---|---|---|
| Course Title | : | **Building Planning and Drawing** |
| Course Code | : | CEPC-304 |
| Semester | : | Third |
| Number of Credits | : | 2 [L:0, T:0, P:4] |
| Prerequisites | : | Engineering Graphics |
| Course Category | : | Program Core Course |

**LEARNING OBJECTIVES**:

| | | |
|---|---|---|
| LO1 | : | To learn basic principles of building planning and drawing |
| LO2 | : | To know graphical representation of various components of buildings. |
| LO3 | : | To draw complete plan and elevation of a building. |
| LO4 | : | To learn basics of perspective drawings and Computer Aided Drawings |

**COURSE OUTCOME**: After the end of the course, students will be able to:

| | | |
|---|---|---|
| CO1 | : | Understand and apply the basic principle in planning of building as per local bye-law. |
| CO2 | : | Interpret the symbols, signs and conventions from the given drawing |
| CO3 | : | Prepare line plans of residential and public buildings using principles of planning |
| CO4 | : | Prepare working drawing as per the given requirements. |

**TEACHING SCHEME**: (in hours/week)

| **Theory** | | | **Practical** | |
|---|---|---|---|---|
| Lecture | Tutorial | Total credits | Practical | credits |
| 0 | 0 | 0 | 4 | 2 |

**TEACHING SCHEME**: (in hours)

| **Theory** | | | **Practical** |
|---|---|---|---|
| Lecture | Tutorial | Total | |
| -- | -- | -- | 60 hrs |

EXAMINATION SCHEME:

| Theory | | | | Practical | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| ESE | | IA | | ESE | | IA | | |
| Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | 150 |
| -- | -- | -- | -- | 60 | 24 | 90 | 36 | |

**DETAILED COURSE CONTENT**:

| Unit | Chapter Title | Contents | Hours |
|---|---|---|---|
| 1 | Planning of Building | Principles of planning for Residential and Public building- Aspect, Prospect, Orientation, Grouping, Privacy, Elegance, Flexibility, Circulation, Furniture requirements, Sanitation, Economy.<br>Space requirement and norms for minimum dimension of different units in the residential and public buildings as per NBC.<br>Provisions of building bye-laws of sanctioning authorities for construction work.<br>Fire and exit requirements in building as per NBC.<br>Plot area, built up area, super built up area, plinth area, carpet area, floor area and FAR (Floor Area Ratio). | 12 |
| 2 | Conventions and Symbols | Conventions as per IS 962, symbols for different materials such as earthwork, brickwork, stonework, concrete, woodwork and glass. | 3 |
| 3 | Building Components | Doors- drawing of fully paneled, partly paneled-partly glazed, flush doors.<br>Windows- drawing of fully paneled, fully glazed, steel framed glazed window.<br>Truss- drawing of king post, Queen post, steel truss<br>Stair case- drawing of dog-legged, open well, straight stair. | 24 |
| 4 | R.C.C. building | Plan. Elevation and Section of Single and two storied residential building (Framed structure type ) showing Foundation plan, Construction notes, Site plan , Area statement | 21 |
| **Total Contact Hours** | | | 60 |

**DISTRIBUTION OF MARKS**

| **Table of Specification** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | Allotted Hours | Objective | | | Short Answer Type | | | | Long Answers Type | | | | | | Total Marks |
| | | R | U | AP | R | U | AP | AN | R | U | AP | AN | E | C | |
| 1 | 12 | 2 | 3 | | | | | | 3 | | | | | | 8 |
| 2 | 3 | 1 | | | | | | | | 2 | | | | | 3 |
| 3 | 24 | | 3 | 2 | | | | | | | 10 | | | | 15 |
| 4 | 21 | 2 | 2 | | | | | | | | 30 | | | | 34 |
| Total | 60 | 5 | 8 | 2 | | | | | 3 | 2 | 40 | | | | 60 |
| **Total Marks** | | **15** | | | **0** | | | | **45** | | | | | | **60** |

**NB: R:** Remember, **U:** Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

**REFERENCE BOOK LIST:**

| Sl No. | Book Name | Author Name | Publishing House, Volume, ISBN |
|---|---|---|---|
| 1 | Civil Engineering Drawing | Malik and Mayo | Computech Publication Ltd New Asian Publishers,New Delhi. |
| 2 | Building Drawing | Shah. M.G. Kale, CM, Patki | Mcgraw Hill Publishing company Ltd. New Delhi |
| 3 | Building Planning and Drawing | Swamy, Kumara; Rao, N, Kameshwara, A | Charotar Publication, Anand. |
| 4 | Planning and design of Building | Sane, Y.S., | Allied Publishers, New Delhi |
| 5 | Building bye laws | --- | GMDA |
| 6 | National Building Code | --- | BIS |

## 5. COURSE TITLE:: AUTO-CAD & 3D MODELING

| | | |
|---|---|---|
| **Course Title** | **:** | **Auto-CAD & 3D modelling** |
| Course Code | : | CEPC-305 |
| Semester | : | Third |
| Number of Credits | : | 2 [L: 0, T: 0, P: 4] |
| Prerequisites | : | Preliminary knowledge of geometry, graphics and building Planning |
| Course Category | : | Program Core |

**LEARNING OBJECTIVES:**

Following are the Learning Objectives of this course:

| | | |
|---|---|---|
| LO1 | : | Understand the AutoCAD interface, including tabs, menu bars, toolbars, and command space. |
| LO2 | : | Utilize various toolbars (Draw, Modify, Standard, Inquiry, Dimension) for creating and editing drawings. |
| LO3 | : | Master fundamental commands such as Line, Polyline, Circle, Arc, Rectangle, Move, Offset, Copy, Trim, Extend, Fillet, Chamfer, Array, and more. |
| LO4 | : | Utilize the Plot Dialog Box to ensure proper output and presentation of drawings. |
| LO5 | : | Understand the SketchUp interface, including the title bar, menu bar, toolbar, and drawing area. |
| LO6 | : | Draw and manipulate 3D objects using lines, edges, and shape tools (rectangle, circle, polygon, etc.). |

**COURSE OUTCOME**: After the end of the course, students will be able to:

| | | |
|---|---|---|
| CO1 | : | Apply various commands related to CAD |
| CO2 | : | Gain the knowledge of basic concept of Building Drawing |
| CO3 | : | Develop knowledge of planning, designing and 2D Drawings |
| CO4 | : | Develop preliminary knowledge of 3D Models. |

**TEACHING SCHEME**: (in hours/week)

| **Theory** | | | **Practical** | |
|---|---|---|---|---|
| Lecture | Tutorial | Total credits | Practical | Credits |
| 0 | 0 | 0 | 4 | 2 |

**TEACHING SCHEME**: (in hours)

| **Theory** | | | **Practical** |
|---|---|---|---|
| Lecture | Tutorial | Total | |
| -- | -- | -- | 60 hrs |

**EXAMINATION SCHEME**:

| Theory | | | | Practical | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| ESE | | IA | | ESE | | IA | | |
| Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | 100 |
| -- | -- | -- | -- | 40 | 16 | 60 | 24 | |

**DETAILED COURSE CONTENT**:

| Unit | Chapter Title | Contents | Hours |
|---|---|---|---|
| 1.0 | **AutoCAD-2D (using AutoCAD Software):** | | |
| 1.1 | Introduction to AutoCAD features | Starting software, Tabs & Menu bars, Toolbars, commands, Command space etc. | 2 |
| 1.2 | Settingup Drawing (Sheet) | Drawing limit, Drawing units, Scale, Option, Selection by cursor, Dimension Style, Arrow, Lineetc. | 2 |
| 1.3 | Basic commands and toolbars | Line-Types, Line by co-ordinates (Absolute, Relative and Polar), Commands under- Draw Toolbar, Modify Toolbar, Standard Toolbar, Inquiry Toolbar, Dimension Toolbar, Functions of Ortho and Osnap command, commands usingKeyboard. | 4 |
| 1.4 | Functions of commands | Line, Polyline, Circle, Arc, Rectangle, Move, Offset, Copy, Stretch, Rotate, Mirror, Scale,Trim, Fillet,Chamfer, Array, Erase, Explode, Hatch, Block, etc | 4 |
| 1.5 | Dimensioning andTexting of a given Drawing | Use of Commands under Dimension Toolbar like Linear, Aligned, Radius, Angular, Diameter, Continue, Multiline Text under Annotate menu. | 2 |
| 1.6 | Plotting of an AutoCAD Drawing | Paper Size, Drawing Scale, Printing Scale, Plot Dialog Box showing name of Plotter, Paper Size, Display Plot Area, Plot Scale, Drawing Orientation etc. | 2 |
| 1.7 | Extra commands and short cut methods in AutoCAD | Break-Line Symbol under express tool, joining lines at right angle by chamfer or fillet, function of region and inquiry toolbar, polyline edit, donut etc. | 2 |
| 2.0 | **3D modeling (using SketchUp Software)** | | |
| 2.1 | Introduction to SketchUp | Welcome screen and templates, Interface overview: how to navigate: title bar, menu bar, getting started toolbar, drawing area, status bar, measurements box, default panels. Saving and reopening a model (Backing up) | 2 |
| 2.2 | Quickstart: Creating 3D Elements | Drawing shapes, Adding volume, Moving elements, Adding textures and colors, Orbit, zoom, pan, Navigation with tools keys and mouse | 2 |
| 2.3 | Creating a 3D Model (Drawing Lines, Shapes, and 3D Objects) | Drawing lines,Workingwith edges, Drawing a rectangle, square, circle, ellipse, polygon, and shape, Editing shapes, Pushing and pulling shapes, Applying colors. | 4 |
| 3.0 | **Practical: 2D Drawings** | | |
| | 3.1 | Open Foundation, wall footing & column footing | 2 |
| | 3.2 | Single line plan of a residential building with provisions | 2 |
| | 3.3 | Layout plan showing column & tie beam | 2 |
| | 3.4 | Double line plan showing requirement of the provisions | 4 |
| | 3.5 | Elevation of the given building | 4 |
| | 3.6 | Section of the given building | 4 |

| | | | |
|---|---|---|---|
| | 3.7 | Staircase (plan and section) | 4 |
| | 3.8 | Section of Road and Railway Track | 4 |
| 4.0 | **Practical: 3D Drawings** | | |
| | 4.1 | Working with Shapes likerectangle, square, circle, ellipse, polygon, etc | 4 |
| | 4.2 | Drawing freehand given shapes | 4 |
| **Total** | | | **60** |

**DISTRIBUTION OF MARKS**

| **Table of Specification** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | Allotted Hours | Objective | | | Short Answer Type | | | | Long Answers Type | | | | | | Total Marks |
| | | R | U | AP | R | U | AP | AN | R | U | AP | AN | E | C | |
| 1 | 18 | 3 | 2 | 2 | | | | | | | 5 | | | | 12 |
| 2 | 8 | 1 | 1 | 1 | | | | | | | 5 | | | | 8 |
| 3 | 26 | | | | | | | | | | 10 | | | | 10 |
| 4 | 8 | | | | | | | | | | 10 | | | | 10 |
| Total | 60 | 4 | 3 | 3 | | | | | | | | | | | |
| **Total Marks** | | **10** | | | **0** | | | | **30** | | | | | | **40** |

**NB: R:** Remember, **U:** Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

**REFERENCE BOOK LIST:**


| **Sl No.** | **Book Name** | **Author Name** | **Publisher** |
|---|---|---|---|
| 1 | Introduction to AutoCAD 2025 for Civil Engineering Applications | Nighat Yasmin | SDC Publications |
| 2 | AutoCAD 2025 Tutorial Second Level 3D Modeling | Randy H. Shih | SDC Publications |
| 3 | AutoCAD Introduction to AutoCAD 3D Design | Shanu Aggarwal | Kindle Edition |
| 4 | Autodesk official training guide | Scott Onstott | Wiley-India |

## 6. COURSE TITLE::WATER RESOURCES ENGINEERING

| COURSE TITLE | : | **Water Resources Engineering** |
|---|---|---|
| Course Code | : | CEPC-306 |
| Semester | : | Third |
| Number of Credits | : | 3 [L:3, T:0, P:0] |
| Prerequisites | : | Nil |
| Course Category | : | Program Core Course |

**LEARNING OBJECTIVES:**

| | | |
|---|---|---|
| LO1 | : | To learn estimation of hydrological parameters |
| LO2 | : | To understand water demand of crops and provisions to meet the same. |
| LO3 | : | To plan for simple irrigation regulatory structures |
| LO4 | : | To design irrigation projects, canals and other diversion works |
| LO5 | : | To learn about the various methods of river |

**COURSE OUTCOME**: After the end of the course, students will be able to:

| | | |
|---|---|---|
| CO1 | : | Estimate hydrological parameters to compute the rainfall and flood discharge. |
| CO2 | : | Classify irrigation and compute crop water requirements for a command area and capacity of canals. |
| CO3 | : | Construct and maintain simple irrigation regulatory structures such as diversion head works, CD works and canal. |
| CO4 | : | Apply the methods of constructions of dams and failure prevention. |
| CO5 | : | Apply site specific methods of river training and protection works. |

**TEACHING SCHEME**: (in hours/week)

| **Theory** | | | **Practical** | |
|---|---|---|---|---|
| Lecture | Tutorial | Total credits | Practical | credits |
| 3 | 0 | 3 | 0 | 0 |

**TEACHING SCHEME**: (in hours)

| **Theory** | | | **Practical** |
|---|---|---|---|
| Lecture | Tutorial | Total | --- |
| 45 hrs | 0 hrs | 45 | --- |

**EXAMINATION SCHEME**:

| Theory | | | | Practical | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| ESE | | IA | | ESE | | IA | | |
| Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | 100 |
| 60 | 24 | 40 | 16 | --- | --- | --- | --- | |

**DETAILED COURSE CONTENT:**

| **Chapter No** | **Chapter Title** | **Content** | **Duration (In Hours)** |
|---|---|---|---|
| | | • Hydrology: Definition and Hydrological cycle. | |

| | | | |
|---|---|---|---|
| 1 | Introduction to Hydrology | • Rain Gauge: Symons rain gauge, automatic rain gauges.<br>• Methods of calculating average rainfall: Arithmetic mean, Isohyetal, and Theissen polygon method.<br>• Runoff, Factors affecting Run off, Computation of run–off.<br>• Flood Discharge measurement: Rational and empirical methods,<br>• Dependable yield of a catchment | 6 |
| 2 | Crop Water Requirement | • Irrigation and its classification.<br>• Crop Water requirement: Cropping seasons, Crop period, base period, Duty, Delta, CCA, GCA, Relationships of duty, Delta and base period, numerical problems.<br>• Intensity of irrigation, factors affecting Duty. Capacity of canal. | 5 |
| 3 | Minor and Micro Irrigation | • Bandhara irrigation: Layout, components, construction and working, solid and open band- hara.<br>• Percolation Tanks – Need, selection of site.<br>• Lift irrigation Scheme-Components and their functions, Lay out.<br>• Drip and Sprinkler Irrigation- Need, components and Layout.<br>• Well irrigation: types and yield of wells, advantages and disadvantages of well irrigation | 9 |
| 4 | Diversion Head Works & Canals | • Diversion head works – Layout, components and their function.<br>• Weir &Barrages – components and their functions. Difference between weir and Barrage.<br>• Canals – Classification according to alignment and position in the canal network, Cross section of canal in embankment and cutting, Design of most economical canal section.<br>• Canal lining - Purpose, material used, advantages.<br>• Cross Drainage works- Aqueduct, siphon aqueduct, super passage, level crossing.<br>• Canal regulators- Head regulator, Cross regulator, Escape, Falls and Outlets. | 10 |
| 5 | Dams and Spillways | • Dams and its classification: Earthen dams and Gravity dams (masonry and concrete).<br>• Earthen Dams – Components with function, typical cross section, seepage through embankment and its control.<br>• Methods of construction of earthen dam, types of failure of earthen dam and preventive measures.<br>• Gravity Dams – Forces acting on dam, typical cross section, concept of high dam and low dam.<br>• Spillways-Definition, function, location, types and | |

| | | | |
|---|---|---|---|
| | | components.. | |
| 6. | River Training Works | • Functions, Components-marginal embankment, Guide bank, spurs, groynes, porcupine.<br>• River bank protection works-necessity and types of river bank protection works | 6 |
| **Total** | | | **45** |

**DISTRIBUTION OF MARKS**

| Table of Specification | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | Allotted Hours | Objective | | | Short Answer Type | | | | Long Answers Type | | | | | Total Marks |
| | | R | U | AP | R | U | AP | AN | R | U | AP | AN | E | C | |
| 1 | 6 | 1 | 1 | - | 1 | 1 | - | - | - | - | - | - | - | - | 4 |
| 2 | 6 | 1 | 1 | - | 1 | 1 | - | - | 2 | | - | - | - | - | 6 |
| 3 | 9 | 1 | 1 | 1 | 2 | 1 | 1 | - | 3 | 3 | 3 | - | - | - | 16 |
| 4 | 9 | 1 | 1 | 1 | 1 | 1 | 1 | - | 2 | 2 | 2 | - | - | - | 12 |
| 5 | 9 | 1 | 1 | 1 | - | 1 | 1 | - | 2 | 3 | 2 | - | - | - | 12 |
| 6 | 6 | 1 | - | 1 | - | 1 | 1 | - | - | 3 | 3 | - | - | - | 10 |
| Total | 45 | 6 | 5 | 4 | 5 | 6 | 4 | - | 10 | 12 | 8 | - | - | - | 60 |
| Total Marks | | 15 | | | 15 | | | | 30 | | | | | | 60 |

**NB: R:** Remember, **U:** Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

**REFERENCE BOOK LIST:**

| **Sl No.** | **Book Name** | **Author Name** | **Publishing House, Volume, ISBN** |
|---|---|---|---|
| 1 | Irrigation and Water Power Engineering | Punmia, B.C., Pande, B, Lal | Laxmi Publications |
| 2 | Engineering Hydrology | Subramanayan | McGraw Hill |
| 3 | Applied Hydrology | Mutreja K N | McGraw Hill |
| 4 | Irrigation Engineering | Sharma, R.K. and Sharma, T.K | S.Chand. |
| 5 | Irrigation Engineering | Basak, N.N., | McGraw Hill Education |
| 6 | Irrigation and Hydraulic Structures | Garg, S K | Khanna Publishers, Delhi. |
| 7 | Irrigation Engineering | Sahasrabudhe S. R | S K Kataria& Sons |

## 7. COURSE TITLE:: BUILDING MATERIAL AND CONSTRUCTION LAB

| | | |
|---|---|---|
| Course Title | : | Building Material and Construction Lab |
| Course Code | : | CEPC 307 |
| Semester | : | Third |
| Number of Credits | : | 1 [L: 0, T: 0, P: 2] |
| Prerequisites | : | NIL |
| Course Category | : | Program Core Course |

**LEARNING OBJECTIVES:**Following are the Learning Objectives of this course:

| | | |
|---|---|---|
| LO1 | : | To learn about various construction materials, and understand their relevant characteristics. |
| LO2 | : | To be able to identify suitability of various materials for different construction purposes. |
| LO3 | : | To Interpret the test results. |
| LO4 | : | To Follow the IS procedure of testing |
| LO5 | : | To Measure the quantities accurately |

**COURSE OUTCOME**: After the end of the course, students will be able to:

| | | |
|---|---|---|
| CO1 | : | Identify the specific equipments required for testing of construction materials |
| CO2 | : | Apply the procedure for testing of construction materials as per relevant BIS code and interpret the results for their suitability in constructions |
| CO3 | : | Examine the quality of various construction materials and their suitability in constructions. |

**TEACHING SCHEME: (**IN HOURS/WEEK)

| **Theory** | | | **Practical (credit)** | |
|---|---|---|---|---|
| Lecture | Tutorial | Total credits | Practical | Credits |
| 0 | 0 | 0 | 2 | 1 |

**TEACHING SCHEME: (IN HOURS)**

| **Theory** | | | **Practical** |
|---|---|---|---|
| Lecture | Tutorial | **Total** | |
| 0 | 0 | 0 | 30 |

**EXAMINATION SCHEME:**

| Theory | | | | Practical | | | | Total Marks | **Pass Marks** |
|---|---|---|---|---|---|---|---|---|---|
| ESE | | IA | | ESE | | IA | | | |
| Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | 100 | 40 |
| --- | --- | --- | -- | 40 | 16 | 60 | 24 | | |

**LIST OF PRACTICALS TO BE PERFORMED:**

| Sl no | Practical to be performed |
|---|---|
| 1 | Determination of water absorption of brick |
| 2 | Determination of compressive strength of brick |
| 3 | Determination of efflorescence of brick |
| 4 | Determination of dimension of brick |
| 5 | Grading (Sieve analysis) of coarse aggregate |
| 6 | Determination of water absorption coarse aggregate |
| 7 | Determination of specific gravity of coarse aggregate |
| 8 | Particle size distribution (Sieve Analysis), fineness modulus and Zone determination for fine aggregates |
| 9 | Determination of Silt and clay content in fine aggregates |
| 10 | Moisture content test for fine aggregates |
| 11 | Determination of specific gravity of Fine aggregates |
| 12 | Determination of bulking of sand |
| 13 | Determination of Compressive strength of AAC block |
| 14 | Determination of Water absorption in AAC block |
| 15 | Density test on AAC block |
| 16 | Determination of water absorption for tiles |
| 17 | Determination of resistance to surface abrasion for tiles |

**REFERENCE BOOK LIST:**

| Sl No. | Book Name | Author Name | Publisher |
|---|---|---|---|
| 1. | Laboratory Manual on Testing of Engineering Materials | Hamant. Sood | New Age International (P) Limited. |
| 2. | Construction Materials | Ghose, D. N | Tata McGraw Hill, New Delhi. |
| 3. | Civil Engineering Construction Materials | S.K. Sharma | ., Khanna Publishing House, New Delhi |
| 4. | Building Materials | Varghese, P.C. | PHI learning, New Delhi |
| 5. | Engineering Materials | Rangwala, S.C. | Charator publisher, Ahemdabad |
| 5. | Civil Engineering Materials | Somayaji, Shan | Pearson education, New Delhi. |
| 6 | Engineering Materials | Rajput, R.K | S. Chand and Co., New Delhi |
| 7. | Engineering Materials | Sharma C. P., , | PHI Learning, New Delhi. |
| 8. | Building Materials | Duggal, S. K, | New International, New Delhi |
| 9. | Relevant IS codes | -- | BIS |

## 8. COURSE TITLE:: BASIC SURVEYING LAB

| | | |
|---|---|---|
| Course Title | : | Basic Surveying Lab |
| Course Code | : | CEPC-308 |
| Semester | : | Third |
| Number of Credits | : | 1 [L:0, T:0, P:2] |
| Prerequisites | : | Student should knowledge in drawing |
| Course Category | : | Program Core Course |

**LEARNING OBJECTIVES:** Following are the Learning Objectives of this course:

| | | |
|---|---|---|
| LO1 | : | To understand types of surveying works required |
| LO2 | : | To know the type of method and equipments to be used for different surveys |
| LO3 | : | To know the use and operational details of various surveying equipments |

Course Outcome: After the end of the course, students will be able to:

| | | |
|---|---|---|
| CO1 | : | Select the type of survey required for given situation. |
| CO2 | : | Conduct traversing and Compute area of open field using chain, tape and compass. |
| CO3 | : | Uses of leveling instruments to determine reduced level and Prepare contour maps and calculation of reservoir volume |

**TEACHING SCHEME: (**IN HOURS/WEEK)

| **Theory** | | | **Practical (credit)** | |
|---|---|---|---|---|
| Lecture | Tutorial | Total credits | Practical | Credits |
| 0 | 0 | 0 | 2 | 1 |

**TEACHING SCHEME: (IN HOURS)**

| **Theory** | | | **Practical** |
|---|---|---|---|
| Lecture | Tutorial | **Total** | |
| 0 | 0 | 0 | 30 |

**EXAMINATION SCHEME:**

| Theory | | | | Practical | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| ESE | | IA | | ESE | | IA | | |
| Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | 150 |
| -- | -- | -- | -- | 60 | 24 | 90 | 36 | |

**DETAILED COURSE CONTENT:**

| Sl no | Topic/Experiment |
|---|---|
| 1 | Measure distance between two survey stations using chain, tape and EDM |
| 2 | Under take a chain survey for a open traverse, ranging the line, taking offset and record field book |
| 3 | Measure Fore Bearing and Back Bearing of survey lines of open traverse using Prismatic Compass. |
| 4 | Measure Fore Bearing and back bearing of a closed traverse of 4 or 5 sides and correct the bearings and included angles for the local attraction. |
| 5 | Undertake Survey Project with chain and compass for closed traverse for minimum 4 sides around a building. |
| 6 | Plot the traverse on drawing sheet for data collected in Survey Project |
| 7 | Determine Reduced Levels by Height of instrument method and Rise and fall method using dumpy level/Auto Level and leveling staff. |
| 8 | Undertake Survey Project with Leveling instrument for Profile leveling and cross-sectioning for a road length of 500 m with cross-section at 30 m interval. |
| 9 | Plot the L-section with minimum 3 cross-sections on Drawing sheet for data collected in Survey Project |
| 10 | Undertake Survey Project for plotting contour map using Square grid method for an area of 150m x 150m with grid of 10m x 10m. |
| 11 | Plot the contours on drawing sheet for data collected in Survey Project . |

**REFERENCE BOOK LIST:**

| **Sl No.** | **Book Name** | **Author Name** | **Publishing House, Volume, ISBN** |
|---|---|---|---|
| 1 | Surveying and Levelling, | Basak, N. N., | McGraw Hill Education, New Delhi. |
| 2 | Textbook of Surveying, | Kochher, C.L, | DhanpatRai Publication. New Delhi. |
| 3 | Surveying and Levelling volume I, | Kanetkar, T. P.; Kulkarni, S. V., | Pune VidyarthiGruhPrakashan. |
| 4 | Surveying I, | Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, | Laxmi Publications, New Del hi. |
| 5 | Survey I, | Duggal, S. K., | McGraw Hill Education, New Delhi. |
| 6 | Surveying and Levelling, Volume 1, | Bhavikatti, S. S., | I. K. International, New Delhi. |
| 7 | Surveying, | Saikia, M D.; Das. B.M.; Das. M.M., | PHI Learning, New Delhi. |

## 9 (A). COURSE TITLE::ENGINEERING ECONOMICS AND ACCOUNTANCY

| | | |
|---|---|---|
| Course Title | : | Engineering Economics and Accountancy |
| Course Code | : | OE 301 |
| Semester | : | Third |
| Number of Credits | : | 2 (L: 2, T: 0, P: 0) |
| Prerequisites | : | Nil |
| Course Category | : | Open Elective |

**LEARNING OBJECTIVES**:

| | | |
|---|---|---|
| LO1 | : | To introduce the students to some important economic and accounting terms. |
| LO2 | : | To acquaint the students with some economic laws and banking organizations etc. |
| LO3 | : | To make the students capable of recording business transaction under double entry system. |
| LO4 | : | To introduce the students about financial statements. |

**COURSE OUTCOME**: After the end of the course, students will be able to:

| | | |
|---|---|---|
| CO1 | : | Define some important economic and accounting terms. |
| CO2 | : | Explain some basic economic laws. |
| CO3 | : | Explain double entry system of book keeping. |
| CO4 | : | Record business transactions under double entry system of book keeping. |
| CO5 | : | Define Financial Statements. |

**TEACHING SCHEME**: (in hours/week)

| **Theory** | | | **Practical (credit)** |
|---|---|---|---|
| Lecture | Tutorial | Total credits | |
| 2 | 0 | 2 | 0 |

**TEACHING SCHEME**: (in hours)

| **Theory** | | | **Practical** |
|---|---|---|---|
| Lecture | Tutorial | Total | Practical |
| 30 | 0 | 30 | 0 |

**EXAMINATION SCHEME**:

| Theory | | | | Practical | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| ESE | | IA | | ESE | | IA | | |
| Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | 100 |
| 60 | 24 | 40 | 16 | 0 | 0 | 0 | 0 | |

**DETAILED COURSE CONTENT**

| **Unit** | **Chapter Title** | **Contents** | **Hours** |
|---|---|---|---|
| Part A: Engineering Economics | | | |
| 1 | Introduction to Economics | Introduction to Economics :<br>1.1Definition of Economics, its utility and definition of engineering economics<br>1.2 Meaning and concepts of utility, National income, inflation and wants. | 2hrs |
| 2 | Demand and Supply | 2.1 Meaning of demand, The Law of demand and demand schedule<br>2.2 Meaning of supply and The Law of supply | 2hrs |

| | | | |
|---|---|---|---|
| 3 | Production | 3.1 Meaning and factors of production and meaning of production function<br>3.2 Factors determining efficiency of labour | 2hrs |
| 4 | Banking Organisations | 4.1 Central Bank – its functions<br>4.2 Commercial banks – its functions | 2hrs |
| 5 | Pricing | 5.1 Objectives of pricing policy<br>5.2 price determinants<br>5.3 Price discrimination | 2hrs |
| B. Accountancy | | | |
| 6 | Introduction to Book-Keeping and Accounting | 6.1 Definition & objectives of Book- keeping<br>6.2 Need and advantages of Book- keeping<br>6.3 Definition of Accounting<br>6.4 Difference between Book- keeping and Accounting<br>6.5 Double Entry System – main features<br>6.6 Advantages and disadvantages of<br>6.7 Double Entry System<br>6.8 Concept of Computerized Accounting Software<br>6.9 Need for Computerized Accounting<br>6.10 Difference between Manual and Accounting and Computerized Accounting | 4hrs |
| 7 | Transaction | 7.1 Definition<br>7.2 Meaning of Account<br>7.3 Classification of Accounts: Traditional Approach, Modern Approach<br>7.4 Meaning of Debit and Credit<br>7.5 Rules of Debit and Credit | 2hrs |
| 8 | Journal and Ledger | 8.1 Meaning Journal<br>8.2 Recording of Transactions in Journal<br>8.3 Meaning of Ledger<br>8.4 Objectives and utility of Ledger<br>8.5 Posting and balancing of Ledger<br>8.6 Distinction between Journal and Ledger<br>8.7 Names of different Books of Accounts | 4hrs |
| 9 | Cash Book | 9.1 Meaning and importance of Cash Book<br>9.2 Characteristics and advantages of Cash Book<br>9.3 Discount – Trade Discount and Cash Discount<br>9.4 Different types of Cash Book:-Single Column Cash Book, Double Column Cash Book, Triple Column Cash Book<br>9.5 Bank Reconciliation Statement –Basic idea | 4hrs |
| 10 | Trial Balance & Errors in Accounting | 10.1 Meaning and objects of Trial Balance<br>10.2 Main features and advantages of Trial Balance<br>10.3 Preparation of Trial Balance<br>10.4 Types of errors in accounting. | 3hrs |
| 11 | Components of Final Accounts: | 11.1 Meaning and objectives of trading Account<br>11.2 Contents of Trading Account<br>11.3 Meaning and objectives of Profit and Loss Account | 3hrs |

| | | | |
|---|---|---|---|
| | | 11.4 Contents of Profit and Loss Account<br>11.5 Meaning of depreciation, revenue expenditure and capital expenditure<br>11.6 Contents of Balance | |
| **Total Contact Hours** | | | **30** |

| **Table of Specification** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | Allotted Hours | Objective | | | Short Answer Type | | | | Long Answers Type | | | | | | Total Marks |
| | | R | U | AP | R | U | AP | AN | R | U | AP | AN | E | C | |
| 1. | 2hrs | 1 | | | 2 | | | | | | | | | | 3 |
| 2. | 2hrs | | 1 | | | | 2 | | | | | | | | 3 |
| 3. | 2hrs | 2 | 1 | | | | | | | | | | | | 3 |
| 4. | 2hrs | | | | | | | | 4 | | | | | | 4 |
| 5. | 2hrs | 2 | 1 | | | | | | | | | | | | 3 |
| 6. | 4hrs | 2 | | | 2 | | | | | 4 | | | | | 8 |
| 7. | 2hrs | | | | | | | | | 5 | | | | | 5 |
| 8. | 4hrs | 1 | | | | 2 | | | | | | 6 | | | 9 |
| 9. | 4hrs | | 1 | | | | | 2 | | | | 6 | | | 9 |
| 10. | 3hrs | 1 | 1 | | 2 | | 2 | | | | | | | | 6 |
| 11. | 3hrs | 1 | | | 2 | 2 | | 2 | | | | | | | 7 |
| Total | 30 hrs | | | | | | | | | | | | | | |
| **Total Marks** | | **15** | | | **20** | | | | **25** | | | | | | **60** |

**NB:R:** Remember, **U:** Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

**REFERENCE BOOK LIST:**

| **Sl No.** | **Book Name** | **Author Name** | **Publishing House, Volume, ISBN** |
|---|---|---|---|
| 1 | Introductory Micro Economics | Sandeep Garg | DhanpatRai Publication Pvt. Ltd. New Delhi |
| 2 | Introductory Macro Economics | Sandeep Garg | DhanpatRai Publication Pvt. Ltd. New Delhi |
| 3 | Theory and Practice of Accountancy | B. B. Dam<br>R. A. Sarda<br>R. Barman<br>B. Kalita | Capital Publishing Company, Guwahati – 5 |
| 4 | Book-Keeping & Accountancy | Juneja, Chawla &Saksena | Kalyani Publisher, New Delhi – 110002 |
| 5 | Tally. ERP 9 For Beginners | Tally Solutions Pvt. Ltd. | Sahaj Enterprises, Bangalore |

## 9(B).COURSE TITLE:: ENVIRONMENTAL POLLUTION & CONTROL

| | |
|---|---|
| Course Title | **Environmental Pollution & Control** |
| Course code | OE302 |
| Semester | Third |
| Number of Credits | 2 (L: 2, T: 0, P: 0) |
| Prerequisites | NIL |
| Course Category | Open Elective |

**COURSE OBJECTIVES**: After the end of the course, students will be able to

| | |
|---|---|
| CO1 | Comprehend the importance of environment and ecosystem. |
| CO2 | Identify different types environmental pollution & their effects. |
| CO3 | Analyze pollution control strategies |
| CO4 | Solve solid waste problems. |
| CO5 | Apply different measures to conserve natural resources. |

**TEACHING SCHEME:**(in hours/week)

| Theory | | | Practical (credit) |
|---|---|---|---|
| Lecture | Tutorial | Total credits | |
| 2 | 0 | 2 | - |

**TEACHING SCHEME**: ( in hours)

| Theory | | | Practical |
|---|---|---|---|
| Lecture | Tutorial | Total | Practical |
| 30 | 0 | 30 | - |

**EXAMINATION SCHEME:**

| Theory | | | | Practical | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| ESE | | IA | | ESE | | IA | | |
| Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | |
| 60 | 24 | 40 | 16 | - | - | - | - | 100 |

**DETAILED COURSE CONTENT**

| Unit | Title | Content | Duration ( hours) |
|---|---|---|---|
| 1 | Introduction | Environment – Definition, Elements of environment, Environmental pollutants | 3 |
| 2 | Elements of ecology | Ecosystem, Basic structure of an ecosystem (biotic & abiotic components), Food chain, Food web, Ecological pyramid. | 4 |
| 3. | Water Pollution | Types, Sources of water pollution, Effects, Control, Natural recovery of water bodies, Importance of rain water harvesting, Water quality standards. | 3 |
| 4. | Air Pollution | Definition, Types, Sources, Effects, Control, Air quality standards, Acid rain, Ozone hole depletion, Green house gases & their effects, Global warming. | 5 |
| 5. | Noise Pollution | Sources, Measurement of noise level, Effects. | 2 |
| 6. | Soil pollution | Sources, Effects due to excessive use of fertilizers, Pesticides, Insecticides, Solid waste – Types, Effects, Methods disposal. | 4 |
| 7. | Radioactive pollution | Types, Sources, Effects. | 2 |
| 8. | Environmental Sanitation | Epidemiology- infectious diseases, sources, transmission of diseases, Occupational health hazards, | 3 |
| 9. | Resources Conservation | Conservation of land, forest, wildlife, minerals, Environmental Management, Pollution Control Strategies. | 4 |
| **Total** | | | **30** |

| TABLE OF SPECIFICATION | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | Allotted Hours | Objectives | | | Short Answer Type | | | | Long Answer Type | | | | | | Total Marks |
| | | R | U | AP | R | U | AP | AN | R | U | AP | AN | E | C | |
| 1 | 3 | 1 | | | 2 | 2 | | | | | | | | | 5 |
| 2 | 4 | 1 | 1 | | 1 | 2 | | | | 3 | | | | | 8 |
| 3 | 3 | 1 | 1 | | | | 2 | | | 2 | 3 | | | | 9 |
| 4 | 5 | 1 | 1 | 1 | 1 | 2 | | | 2 | 3 | 4 | | | | 15 |
| 5 | 2 | | 1 | | | 2 | | | | | | | | | 3 |
| 6 | 4 | 1 | | | | 2 | | | | | 3 | | | | 6 |
| 7 | 2 | 1 | | | | 2 | | | | | | | | | 3 |
| 8 | 3 | | 1 | 1 | | | 2 | | | | | | | | 4 |
| 9 | 4 | 1 | 1 | | | 2 | | | | | 3 | | | | 7 |
| Total | 30 | 7 | 6 | 2 | 4 | 14 | 4 | | 2 | 8 | 13 | | | | |
| Total Marks | | 15 | | | 22 | | | | 23 | | | | | | 60 |

NB: R: Remember, U: Understand, AP: Apply, AN: Analyze, E: Evaluate, C: Create

**REFERENCE BOOK LIST**

| Sl No. | Title of the Book | Name of Authors | Name of the Publisher |
|---|---|---|---|
| 1 | Environmental Studies | S.C. Sharma& M.P. | Khanna Publishing |

| | | | |
|---|---|---|---|
| | | Poonia | House, New Delhi l |
| 2 | Environmental Pollution Control & Engineering | C. S. Rao | New Age International Publication |
| 3 | Air Pollution & Control | Keshav Kant | Khanna Publishing House, New Delhi |
| 4 | Elements of Environmental Pollution Control | O. P. Gupta. | Khanna Publishing House, New Delhi |
| 5 | Waste Water Engineering | Metcalf & Eddy | Mc-Graw Hill |
| 6 | Fundamentals of renewable energy processes | Aldo Vieira, Da Rosa | Academic Press Oxford |

## 9(C). COURSE TITLE:: SOLID WASTE MANAGEMENT

| | | |
|---|---|---|
| Course Title | : | **Solid Waste Management** |
| Course Code | : | OE 303 |
| Semester | : | Third |
| Number of Credits | : | 2 (L: 2, T: 0, P: 0) |
| Prerequisites | : | Nil |
| Course Category | : | Open Elective |

**LEARNING OBJECTIVES**:

| | | |
|---|---|---|
| LO1 | : | Knowledge on the sources of solid waste |
| LO2 | : | Knowledge on the process and techniques of solid waste management |
| LO3 | : | Comprehend the concepts of composting |
| LO4 | : | Understand the ways of different types of waste management |

**COURSE OUTCOME**: After the end of the course, students will be able to:

| | | |
|---|---|---|
| CO1 | : | Recognize the different types and sources of solid waste |
| CO2 | : | Apply different techniques of collection, storage and transportation of solid waste. |
| CO3 | : | Compost and disposal of solid waste. |
| CO4 | : | Aware about the importance and ways of biomedical, industrial and E-waste management. |

**TEACHING SCHEME**: (in hours/week)

| **Theory** | | | **Practical (credit)** |
|---|---|---|---|
| Lecture | Tutorial | Total credits | |
| 2 | 0 | 2 | 0 |

**TEACHING SCHEME**: (in hours)

| **Theory** | | | **Practical** |
|---|---|---|---|
| Lecture | Tutorial | Total | Practical |
| 30 | 0 | 30 | 0 |

**EXAMINATION SCHEME**:

| Theory | | | | Practical | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| ESE | | IA | | ESE | | IA | | |
| Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | Full Marks | Pass Marks | 100 |
| 60 | 24 | 40 | 16 | 0 | 0 | 0 | 0 | |

**DETAILED COURSE CONTENT**

| Unit | Chapter Title | Contents | Hours |
|---|---|---|---|
| I | Introduction | **1.1** Definition of solid waste, different solid waste – domestic Waste, commercial waste, industrial waste, market waste, agricultural waste, biomedical waste, E-waste, hazardous waste, institutional waste, etc.<br>**1.2** Sources of solid waste, Classification of solid waste – hazardous and non- hazardous waste.<br>**1.3** Physical and chemical characteristics of municipal solid waste.<br>**1.4** Impact of solid waste on environment, factors affecting solid waste generation. | 6 |
| 2 | Storage, collection and Transportation | **2.1** Collection, segregation, storage and transportation of solid waste. | 9 |

| | | | |
|---|---|---|---|
| | of Municipal solid waste | **2.2** Tools and Equipment-Litter Bin, Broom, Shovels, Handcarts, Mechanical road sweepers, Community bin - like movable and stationary bin.<br>**2.3** Transportation vehicles with their working capacity - Animal carts, Auto vehicles, Tractors or Trailers, Trucks, Dumpers, Compactor vehicles. Transfer station- meaning, necessity, location.<br>**2.4** Role of rag pickers and their utility for society.<br>**2.5** Organization pattern of solid waste management system, practices according to population of the city. | |
| 3 | Composting of solid waste and techniques of disposal of solid waste | **3.1** Concept of composting of waste, Principles of composting process. Factors affecting the composting process.<br>**3.2** Methods of composting – Manual Composting – Bangalore method, Indore Method, Mechanical Composting – Dano Process, Vermi composting.<br>**3.3** Solid waste management techniques – solid waste management hierarchy, waste prevention and waste reduction techniques<br>**3.4** Land filling technique, Factors to be considered for site selection, Land filling methods-Area method, Trench method and Ramp method, Leachate and its control, Biogas from landfill, Advantages and disadvantages of landfill method, Recycling of municipal solid waste<br>**3.5** Incineration of waste: Introduction of incineration process, Types of incinerators, Products of incineration process with their use, Method of Pyrolysis of waste. | 10 |
| 4 | Biomedical, Industrial and E-waste management | **4.1** Definition of Bio medical Waste.<br>**4.2** Sources and generation of Biomedical Waste and its classification and management technologies.<br>**4.3** Variety of industrial waste, collection and disposal of industrial waste<br>**4.4** Control measures of industrial waste.<br>**4.5** Definition, varieties and ill effects of E- waste,<br>**4.6** Recycling and disposal of E- waste. | 5 |
| **Total Contact Hours** | | | **30** |

**Table of Specification**

| Units | Allotted Hours | Objective | | | Short Answer Type | | | | Long Answers Type | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | R | U | AP | R | U | AP | AN | R | U | AP | AN | E | C | |
| 1. | 6 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 9 |
| 2. | 9 | 4 | 1 | 0 | 4 | 4 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 21 |
| 3. | 10 | 4 | 1 | 0 | 4 | 4 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 21 |
| 4. | 5 | 2 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 9 |
| Total | 30 | 11 | 4 | 0 | 10 | 10 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | |
| **Total Marks** | | **15** | | | **20** | | | | **25** | | | | | | **60** |

**NB:R:** Remember, **U:** Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

**REFERENCE BOOK LIST:**

| Sl No. | Book Name | Author Name | Publishing House, Volume, ISBN |
|---|---|---|---|
| 1 | Solid Waste Management | K.Sasikumar and SanoopGopi Krishna | PHI Learning Private Limited, Delhi |
| 2 | Solid Waste Management | Iqbal H. Khan and Naved Ahsan | CBS Publishers & Distributors Pvt. Ltd. |
| 3 | Solid and Liquid Waste Management | VasudevanRajaram, Faisal Zia Siddiqui, Sanjeev Agrawal and Mohammad Emran Khan | PHI Learning Private Limited |
| 4 | Solid Waste Management | H.S. Bhatia | Misha Books |
| 5 | Solid and Hazardous Waste Management | M.N. Rao and Razia Sultana | BS Publications |

## 9(D). COURSE TITLE:: DESIGN THINKING & DEVELOPING INNOVATIVE IDEAS (Infosys Springboard)

| | | |
|---|---|---|
| Course Title | : | **Design Thinking & Developing Innovative Ideas** |
| Course Code | : | OE-304 |
| Semester | : | Third |
| Number of Credits | : | 2 [L: 2, T: 0, P: 0] |
| Prerequisites | : | Basic knowledge of creative ideas and innovation |
| Course Category | : | Open Elective-I |

**Online Course Link**: …….

## 9(E) COURSE TITLE:: DESIGN THINKING & DEVELOPING INNOVATIVE IDEAS (TATA TECHNOLOGIES)

| | | |
|---|---|---|
| Course Title | : | **Innovation, Design Thinking and prototyping** |
| Course Code | : | OE-305 |
| Semester | : | Third |
| Number of Credits | : | 2 [L: 2, T: 0, P: 0] |
| Prerequisites | : | Basic knowledge of creative ideas and innovation |
| Course Category | : | Open Elective |

**REFERENCE BOOK LIST:**

As per TATA Technologies curriculum.

## 10. COURSE TITLE:: ESSENCE OF INDIAN KNOWLEDGE AND TRADITION

| Course Code: | Subject Title | Semester | Hours Per Week | | | Credit |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| AU-301 | Essence of Indian Knowledge and Tradition | III | 2 | 0 | 0 | 0 |

**Pre-requisites: Nil**

**Learning Objectives:**

1. To introduce the foundational elements of Indian Knowledge Systems (IKS).
2. To explore the scientific and technological heritage of India in ancient times.
3. To build awareness of traditional Indian philosophy, ethics, and medicine.
4. To encourage appreciation for the relevance of IKS in modern contexts.
5. To develop basic research interest in India's indigenous knowledge base and innovations.

**Course Outcome (CO):** After completion of this course, the students will be able to:

| CO | Statement of Course Outcomes |
|---|---|
| CO1 | Explain the concept, scope, and sources of Indian Knowledge Systems. |
| CO2 | Identify significant contributions of ancient India to science, technology, and mathematics. |
| CO3 | Understand traditional Indian governance, education, and core societal values. |
| CO4 | Understand traditional wellness systems and sustainable living practices rooted in Indian Knowledge Systems. |
| CO5 | Appreciate Traditional Indian Knowledge and its relevance in modern contexts. |

**Syllabus:**

| Unit No. | Description | Contact Hours |
|---|---|---|
| I | **Fundamentals of Indian Knowledge System(IKS):**<br>• Definition, Importance, and Scope of IKS<br>• Overview of major IKS Texts: Vedas, Upanishads, Puranas etc.<br>• Classification of knowledge in Indian traditions: Vidyas (Science) and Kalas (Arts) | 4 |

| | | |
|---|---|---|
| II | **Science and Technological Heritage:**<br>• Mathematics: Sulbasutras, Contributions of Aryabhatta, Bhaskaracharya<br>• Astronomy and Cosmology: SuryaSiddhanta, Planetary motion, Concept of Time<br>• Metallurgy and Material Sciences: Iron Pillar, Woltz Steel, Ayurvedic alloys<br>• Chemistry of Dyes, Pigments and Chemicals<br>• Civil Engineering and Architecture: Temple architecture, Town planning and water<br>• management | 12 |
| III | **Governance, Society and Education Systems:**<br>• Ancient Indian Polity and Administration<br>• Education systems: Gurukula, Nalanda, Takshashila<br>• Value based education: Satya, Ahimsa, Seva<br>• Role of Teacher and Student in Society | 6 |
| IV | **IKS in Holistic Wellness and Sustainable Living:**<br>• Foundations of Ayurveda, Yoga and Siddha<br>• Holistic health and wellness practices<br>• Agriculture, Animal husbandry, Sacred groves, Sacred water bodies; Land, Water and Soil Conservation and Management practices. | 4 |
| V | **The Modern Relevance of Indian Knowledge Systems:**<br>• Practices of Traditional Indian Knowledge in Modern Science and Engineering<br>• IKS and Entrepreneurships: Organic Farming ,Ayurveda based Start-ups<br>• Government initiatives: National Education Policy 2020, IKS Division under AICTE | 4 |
| | Total Contact Hours | 30 |

**Suggested Books and Other Study Materials:**


1. "Indian Knowledge Systems"-Kapil Kapoor and Avadhesh Kumar Singh.
2. "Ancient Indian Leaps into Mathematics"- B.S.Yadav.
3. "Science and Technology in Ancient India"- O.P.Jaggi.
4. "The Positive Sciences of the Ancient Hindus"- Brajendranath Seal.
5. AICTE Model Curriculum for IKS(Available online)


- NPTEL/SWAYAM courses on IKS
- AICTE-IKS Portal(https://iksindia.org/)
- Digital Library of India (https://dli.gov.in)

**Table of Specification for Essence of Indian Knowledge and Tradition (Theory)**

| Sl No | Contact Hours | Units | Objective | | | Short answer type | | | | Long answer type | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | R | U | AP | R | U | AP | AN | R | U | AP | AN | E | C | |
| 1 | 4 | Unit I | 1 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 8 |
| 2 | 12 | Unit II | 3 | 1 | 1 | 2 | 2 | 0 | 0 | 1 | 2 | 3 | 9 | 0 | 0 | 24 |
| 3 | 6 | Unit III | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 2 | 1 | 1 | 3 | 0 | 0 | 12 |
| 4 | 4 | Unit IV | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 8 |
| 5 | 4 | Unit V | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 8 |
| | 30 | Total Marks | 7 | 5 | 3 | 8 | 6 | 0 | 0 | 5 | 5 | 9 | 12 | 0 | 0 | 60 |

**NB: R**: Remember, **U**: Understand, **AP**: Apply, **AN**: Analyze, **E**: Evaluate, **C**: Create

**Annexure-1: Essence of Indian Knowledge and Tradition (Theory)**

| SI No | Units | Time Allotted (Hrs) | Percentage Weightage | R | U | AP | AN | E | C | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | I | 4 | 13.33% | 2 | 3 | 3 | 0 | 0 | 0 | 8 |
| 2 | II | 12 | 40.00% | 6 | 5 | 4 | 9 | 0 | 0 | 24 |
| 3 | III | 6 | 20.00% | 5 | 3 | 1 | 3 | 0 | 0 | 12 |
| 4 | IV | 4 | 13.33% | 4 | 3 | 1 | 0 | 0 | 0 | 8 |
| 5 | V | 4 | 13.33% | 3 | 2 | 3 | 0 | 0 | 0 | 8 |
| | Total | 30 | 100% | 20 | 16 | 12 | 12 | 0 | 0 | 60 |

**Curriculum Development cell, State Council for Technical Education, Directorate of Technical Education, Assam**

| Sl. No. | Name | Designation |
|---|---|---|
| 1 | Shri Dhrubajyoti Borah, ACS | Director of Technical Education, Assam |
| 2 | Dr. Indrani Gogoi | Joint Director of Technical Education, Assam |
| 3 | Dr. Mrinalini Das | Controller of Examination, State Council for Technical Education, DTE, Assam |
| 4 | Mr. Ankush Borgohain | Training cum Placement Officer, DTE, Assam |
| 5 | Shri Ashok Das | Principal, Assam Textile Institute |
| 6 | Dr. Utpal Baruah | Principal, Kamrup Polytechnic |
| 7 | Shri Boobool Sarma | Assistant Controller of Examination, SCTE, DTE, Assam |

**Academic Expert Committee for Civil Engineering**

| Sl No. | Name | Institute | Designation |
|---|---|---|---|
| 1 | Dr. Krishna Kamal Das, Lecturer, SS (M.Secy) | Bongaigaon Polytechnic, Bongaigaon | Member Secretary |
| 2 | Mr. Nripen Majumder, Princpal (i/c) | Barpeta Polytechnic, Barpeta | Member |
| 3 | Mr. Kabindra Mudoi, HoD | Golaghat Polytechnic, Golaghat | Member |
| 4 | Mr. Anjan Barman, Lect.(SG) | Assam Engineering Institute, Guwahati. | Member |
| 5 | Mr. Shekhar Jyoti Baruah, Lecturer. | Dibrugarh Polytechnic, Dibrugarh | Member |